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RECORD OF DECISION

for the

TOMAH MUNICIPAL SANITARY LANDFILL GROUNDWATER OPERABLE UNIT OU-2

Tomah, Wisconsin

Environmental Protection Agency
Region 5
Chicago, Illinois

{September 24, 2003}

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PART 1: THE DECLARATION

1.1 Site Name and Location - Tomah Municipal Sanitary Landfill, Tomah, Monroe County, Wisconsin Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS) Identification Number WID980610307.

1.2 Statement of Basis and Purpose

1.2.1 This decision document presents the United States Environmental Protection Agency's (U.S. EPA's) Selected Remedy for Groundwater Operable Unit 2 (OU-2) at the Tomah Municipal Sanitary Landfill, Tomah, Wisconsin, which was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record for this action, an index for which is appended to this document as Appendix B.

1.2.2 The State of Wisconsin's concurrence with the selected remedy is anticipated. The concurrence letter will be added to the Administrative Record upon receipt.

1.3 Assessment of Site - The response action selected in this Record of Decision (ROD) is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment; and pollutants or contaminants from this site, which may present an imminent and substantial endangerment to the public health or welfare.

1.4 Description of Selected Remedy

1.4.1 The major components of the selected remedial action for Groundwater Operable Unit 2 (OU-2) include monitored natural attenuation (MNA) with long-term monitoring and institutional controls.

1.4.2 Groundwater Operable Unit 2 (OU-2) is the second and last planned remedy for this site. The Source Control Operable Unit 1 (OU-1) was addressed in the September 1997 ROD, which included capping the 18-acre landfill, expanding the existing active gas collection system, and monitoring the effectiveness of the remedial action. The source control remedy has been effective in eliminating landfill gas migration and reducing volatile organic compound concentrations in groundwater.

1.4.3 There are no principal threat wastes for this operable unit. For an operable unit

comprising contaminated groundwater, there generally are no principal threat wastes unless non-aqueous phase liquids (NAPLs) have been identified within the boundaries of the operable unit. No NAPLs have been identified here.

1.5 Statutory Determinations

1.5.1 The selected remedy attains the mandates of CERCLA Section 121 and to the extent practicable, the NCP. Specifically, the remedy is protective of human health and the environment, complies with federal and state applicable or relevant and appropriate requirements, and is cost effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

1.5.2 This remedy does not satisfy the statutory preference for treatment as a principal element of the remedy (i.e., reduces the toxicity, mobility, or volume of hazardous substances, pollutants, or contaminants as a principal element through treatment). However, MNA will break down hazardous substances and contaminants in the groundwater thereby reducing the toxicity and volume of contamination. This will achieve the same beneficial results that an engineered treatment system would accomplish.

1.5.3 Because this remedy will result in hazardous substances remaining on the site at levels preventing unlimited exposure and unrestricted use after the remedial action has taken place, the five-year review requirement set forth in section 121(c) of CERCLA, 42 U.S.C. § 9621(c), applies to the action.

1.6 ROD Data Certification Checklist - The following information is in the *Decision Summary* section of this ROD. Additional information can be found in the Administrative Record file for this site.

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1.6.8 Key factor(s) that led to selecting the remedy (i.e., describe how the selected remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision) - Page 15

1.7 Authorizing Signature

Wm. E. Muno

William E. Muno, Director
Superfund Division

9/24/03

Date

PART 2: THE DECISION SUMMARY

2.1 Site Name, Location and Description

2.1.1 The Tomah Municipal Sanitary Landfill (TMSL) is located north of the City of Tomah, Monroe County, Wisconsin (Figure 2-1). The landfill occupies approximately 18 acres within the 40-acre site (Figure 2-2). The site is bordered on the north by Deer Creek and its associated wetlands, on the east by Noth Avenue and agricultural property, on the south by the Sunnyvale Subdivision, and on the west by agricultural fields and wetlands.

2.1.2 The CERCLIS Identification Number is WID980610307.

2.1.3 The lead agency is the United States Environmental Protection Agency (U.S. EPA).

2.2 Site History and Enforcement Activities

2.2.1 The City of Tomah ("City" or "Tomah") operated the TMSL as a disposal site from 1959 to 1979, disposing of municipal and industrial wastes on 18 acres located on the southern portion of the site. Wastes were placed in shallow (3 to 8 feet) unlined trenches, which were excavated in the sandy subsoils over the southern half of the site and covered with native soils.

2.2.2 In August 1975, the Wisconsin Department Natural Resources (WDNR) ordered the City to close the site because of potential degradation of local groundwater quality. The City closed the site in 1979, covered it with soil and topsoil, and planted grass and trees on the site.

2.2.3 In June 1981, Union Camp Corporation submitted a Notification of Hazardous Waste Activity for a facility in Tomah. The company reported that from 1960 to 1977, it had disposed of 75,700 gallons of solvent waste from plastics and printing operations at the TMSL. These wastes contained volatile organic compounds (VOCs) and heavy metals.

2.2.4 In December 1983, representatives of the WDNR conducted a Potential Hazardous Waste Site Preliminary Assessment for the TMSL. The WDNR assessment indicated that the landfill represented a potential hazard to groundwater and surface water, and that there could be other migration pathways.

2.2.5 In June 1984, the WDNR and the consulting firm Ecology and Environment, under authorization of the U.S. EPA, conducted a site inspection. A groundwater sample from a downgradient monitoring well contained organic contamination above the levels of health concern. Based on this and other findings, WDNR nominated the site for inclusion on U.S. EPA's National Priorities List (NPL) on April 3, 1985. The site was subsequently

added to the NPL on March 31, 1989.

2.2.6 In February 1992, U.S. EPA's Technical Assistance Team (TAT) sampled nine residential wells in the Sunnyvale Subdivision adjacent to the TMSL. One residential well contained elevated levels of vinyl chloride.

2.2.7 In 1993, the City provided municipal water to homes in the Sunnyvale Subdivision, south of the site, to eliminate the potential hazard posed by the landfill to private drinking wells in the subdivision. The private wells were subsequently abandoned.

2.2.8 Research to identify parties responsible for conditions at the TMSL was completed early in 1993. U.S. EPA identified 3 potentially responsible parties (PRP): the City of Tomah as owner and operator of the landfill; and Union Camp Corporation (now International Paper Company) and the Veterans Hospital as generators of hazardous substances disposed of at the site. U.S. EPA sent a special notice letter to the PRPs in July 1993, to conduct a Remedial Investigation/Feasibility Study (RI/FS) with oversight by the U.S. EPA. On January 11, 1994, an Administrative Order on Consent (AOC) was entered into voluntarily by the PRPs to conduct the RI/FS at the TMSL site.

2.2.9 In July 1996, the PRPs installed an active gas extraction system along the southern boundary of the landfill to address landfill gas migrating off-site.

2.2.10 The U.S. EPA signed a Record of Decision on September 25, 1997 for Source Control Operable Unit 1 (OU-1). The selected remedy included capping the landfill, expanding the existing active gas collection system, and monitoring the effectiveness of the remedial action. On September 30, 1998, an AOC was entered into by Union Camp to conduct the remedial design. On September 30, 1999, a Unilateral Administrator Order was issued for the remedial action. Subsequently, the PRPs signed a Consent Decree (February 19, 2002) for the remedial action, which superseded the Unilateral Order. The Completion of Construction Report for the remedial action was approved on August 29, 2001.

2.2.11 Groundwater Operable Unit 2 (OU-2) was addressed in a separate Feasibility Study. Additional groundwater studies were conducted to evaluate the hydrogeochemical conditions, identify natural attenuation processes, and determine the fate and transport of VOCs.

2.2.12 In March 2003, the City began plans to provide municipal water to homes along Flatter Avenue, which is northeast of the TMSL. The installation was completed in August 2003. All but two of the homes were connected to the municipal water supply. Private wells will be abandoned in the near future at the homes supplied with municipal water.

2.3 Community Participation

2.3.1 In June 1994, U.S. EPA hosted a "kick-off" public meeting at the Tomah City Hall Council Chambers. The purpose of the meeting was to inform local residents of the Superfund process and the work to be performed under the RI.

2.3.2 In 1993, U.S. EPA established an information repository at the Tomah Public Library, 716 Superior Avenue, Tomah, Wisconsin. U.S. EPA maintains a copy of the Administrative Record for the OU-1 and OU-2 remedy decisions in the information repository. The RI and FS for OU-1 were released to the public in July 1996 and April 1997, respectively. A Proposed Plan for OU-1 was made available on August 7, 1997. A public meeting was held on August 18, 1997, to discuss the RI/FS and Proposed Plan. The public generally supported the selected remedy. The OU-1 ROD was signed by the U.S. EPA on September 25, 1997.

2.3.3 The Proposed Plan for OU-2 was issued June 6, 2003. The public comment period for the Proposed Plan was initially set to run from June 10, 2003 to July 10, 2003, but was extended until July 24, 2003. A public meeting was held June 24, 2003.

2.3.4 The public participation requirements of section 113(k)(2)(B) and 117 of CERCLA, 42 U.S.C. §§ 9613 (k)(2)(B) and 9617, have been met in the remedy selection process. This decision document presents the selected remedy for OU-2, chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by the Superfund Amendment and Reauthorization Act (SARA), and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The decision for this site is based on the Administrative Record.

2.4 Scope and Role of the Operable Unit or Response Action

2.4.1 The 1997 ROD only addressed the source component at TMSL. The source control remedy has been effective in eliminating landfill gas migration and reducing the volume of volatile organic compound leaking into the groundwater.

2.4.2 This ROD addresses the off-site groundwater contamination. The concentration of contaminants in groundwater exceeds the U.S. EPA's acceptable risk range. This final response action for groundwater addresses the principal remaining threat at the site through monitored natural attenuation (MNA) with long-term monitoring and institutional controls.

2.5 Site Characteristics

2.5.1 *Conceptual Site Model:* The Conceptual Site Model (CSM) for the risk assessment and

response action was based on residential receptor exposure by ingestion, inhalation, and/or direct contact with contaminants in groundwater. U.S. EPA used data collected during the RI to assess human health and ecological risks. Groundwater was not addressed as a separate risk factor in the ecological risk assessment because, based on the hydrogeologic data in the RI, the shallow groundwater discharges to Deer Creek and its associated wetlands. Thus, the exposure to chemicals of concern (COCs) in groundwater would occur through the surface water pathway. Actual damage to the aquatic and terrestrial ecosystem of Deer Creek and the adjacent wetlands was not observed. However, there is a possibility that future impacts could occur from the discharge of contaminated groundwater into the surface water system.

2.5.2 *Overview of Site:*

2.5.2.1 *Geology:* Data from soil borings indicate that the TMSL is underlain predominantly by residual sand material, formed by the in-place weathering of sandstone bedrock, and alluvial unconsolidated sands overlying the sandstone bedrock. The unconsolidated material consists of silty sands to poorly graded fine- to medium-grained sand. The thickness of the unconsolidated deposits in the immediate vicinity of the landfill ranges from 1 to 19 feet and generally increases toward Deer Creek

Underlying the unconsolidated sands is sandstone bedrock of Cambrian age. Two sandstone mounds are located in the southwest and southeast corners of the site. The bedrock surface slopes down from the sandstone mounds in all directions.

2.5.2.2 *Hydrology*: The TMSL site lies in the Deer Creek valley, which is the primary drainage way near the site. Deer Creek flows northeast across the northwestern corner of the property, within 230 feet of the northwest corner of the landfilled area. The creek meanders through an extensive emergent wetland located on the northwest portion of the property and joins Lemonweir Creek about one mile east of the site. Deer Creek is classified as a cold water sport fishery (trout stream).

The moderately permeable site soils permit infiltration and restrict the volume of overland flow. Surface runoff across the landfill is generally north toward Deer Creek, with the exception of the low area along the southern property boundary where runoff drains to the south.

2.5.2.3 *Hydrogeology*: Groundwater beneath the site was encountered within the unconsolidated deposits, the landfill waste, and the bedrock. The data collected indicates that the unconsolidated sand and the sandstone bedrock generally function as a single aquifer. The water level data indicate that the groundwater flow is northeast toward Deer Creek and the surrounding wetlands averaging velocities between 0.03 to 0.37 feet/day. The groundwater contribution to Deer Creek appears to be limited to the shallow portion of the aquifer. Deeper flow

may occur beneath Deer Creek.

The majority of the landfill appears to be unsaturated. However, investigations showed up to 2 feet of saturated waste at the base of the landfill in some areas. The total thickness of the waste is approximately 10 - 12 feet. Using the highest water levels measured at the site, U.S. EPA estimates that 19,000 out of the 300,000 cubic yards in the landfill may be saturated. However, seasonal fluctuations in the water table make it difficult to estimate the volume of saturated wastes with any reliability.

The City and the majority of the private well owners obtain their water supply from the Cambrian age sandstone aquifers. The City provides municipal water for all residential properties within the city limits. Residents living outside of the city limits obtain their water supply from private wells except for those persons living in the Sunnyvale Subdivision who are serviced by municipal water. The City has recently connected the subdivision northeast of Deer Creek on Flatter Avenue to municipal water. There remain seven private wells currently in use within one-half mile of the site. These are located northeast and east of the site. Well logs from the current property owners indicate that several of the wells are screened in the sandstone at depths of 50 to 80 feet.

2.5.2.4 *Ecology*: The TMSL site is zoned as conservancy. The areas to the north, east and west are classified as vacant or agricultural. Deer Creek flows northeast across the northwestern corner of the site. The WDNR has recently re-classified Deer Creek from a Class II to a Class I trout habitat. Adjacent woodlands, wetlands, and fields add to the diversity of wildlife habitat in the area. Wildlife species found at the site are typical of an urbanizing rural agriculture area or transients from adjacent habitats.

WDNR's Bureau of Endangered Resources reports no known occurrences of threatened, endangered, or special concern species; natural communities; or State Natural Areas that would be affected by remedial actions at the TMSL site. The U.S. Fish and Wildlife Service does report that two federally listed species occur in Monroe County (Karner Blue Butterfly and Northern Monkshood). However, the U.S. Fish and Wildlife Service concluded that due to the nature and locations of the proposed activities, the species identified would not be adversely affected.

2.5.2.5 *Groundwater Contamination*: The OU-1 quarterly groundwater monitoring program began in July 2000 to monitor the effectiveness of the OU-1 remedy. MNA parameter sampling was conducted over four quarterly sampling events beginning in November 2001 and a vertical aquifer sampling (VAS) study was conducted in the Fall of 2002. Seven hydrocarbon compounds have been detected in groundwater samples above their respective Wisconsin Enforcement Standard

(WES). These compounds include 1,1-dichloroethene, 1,2-dichloroethane, 1,2-dichloropropane, cis-1,2-dichloroethene, tetrachloroethene, vinyl chloride, and benzene. Vinyl chloride and benzene were the most frequently detected VOCs, but the benzene detected has not been as wide spread as vinyl chloride.

Based on the results of the long-term monitoring program, MNA parameter sampling, and the VAS study, the horizontal extent of VOCs extends from the landfill approximately 1,600 feet toward the northeast and encompasses an area of approximately 40 acres of unoccupied woodlands and wetlands. The plume extends vertically to depths near 140 feet below ground surface (bgs). There has been no observed change in the horizontal extent of the VOC plume since monitoring began in July 2000. The groundwater results are described under the framework of three horizons (A, B, and C).

Monitoring wells in the A-horizon represent the upper 10 to 30 feet bgs of the aquifer. The highest concentration of vinyl chloride was 180 ug/l and it was at the center of the plume. The extent of vinyl chloride is relatively small with the majority of "A" well samples exhibiting low to non-detectable levels of vinyl chloride.

Monitoring wells in the B-horizon represent the 30 to 40 feet bgs interval of the aquifer. The highest concentration of vinyl chloride was 630 ug/l and it was at the center of the plume. Only one off-site monitoring location has benzene above the WES at a concentration of 12 ug/l and it is at the front edge of the plume. The extent of VOCs is greater in the B-horizon than in the A-horizon.

The C-horizon represents the portion of the aquifer from 55 to 65 feet bgs. The extent of vinyl chloride in the C-horizon is comparable to the B-horizon. The highest concentration of vinyl chloride was 680 ug/l and it was at the center of the plume. The highest concentration of benzene is 61 ug/l and it is also at the center of the plume.

The impact of inorganic compounds to groundwater is primarily confined to on-site monitoring wells, with only one off-site well having concentrations above background levels. The one notable exception is chloride. Chloride plumes are commonly associated with landfills and they indicate that contaminants are degrading naturally.

The only metals detected above the Maximum Contaminant Level (MCL) and WES since July 2000 are arsenic, iron, manganese, and thallium. Iron and manganese were the most commonly detected inorganics. The elevated levels of these compounds have also been detected in background wells above their WES. One off-site well, which is less than 400 feet from the site boundary has elevated

levels of iron and manganese.

2.6 Current and Potential Future Land and Resource Uses.

2.6.1 Currently, the TMSL site is zoned conservancy. The areas to the north, east, and west are classified as agricultural. The agricultural land located to the east is currently not used, but the land to the west of the landfill is used as pasture. Residential developments are located to the south of the landfill and east of Deer Creek. It is anticipated that the current land uses will continue into the future.

2.6.2 The City and the majority of the private well owners obtain their water supply from the Cambrian age sandstone aquifers. The City provides municipal water for all residential properties within the city limits. The City also provides municipal water to the Sunnydale development, which is outside the city limits. The City obtains groundwater from high capacity wells located 1.2 to 3 miles from the site and the production zone for the wells is within the sandstone aquifer at depths greater than 100 feet. The City has recently connected Flatter Avenue residents to the City's municipal water supply system and their private wells will be abandoned in the near future. Approximately seven private wells are currently used within one-half mile of the site.

2.7 Summary of Site Risks U.S. EPA used data collected during the RI to assess human health and ecological risks. The Risk Assessment Report was completed in 1996. This assessment compared contamination levels at the site with U.S. EPA's standards. In addition, further assessment of conditions at the site compared contamination levels with Wisconsin Administrative Code Chapter NR 140 (1996), Groundwater Standards. The assessment considered ways in which people and wildlife could be exposed to site-related contaminants and whether such exposure could increase the incidence of cancer and non-carcinogenic diseases above the levels that normally occur in the study area.

2.7.1 *Summary of Human Health Risk Assessment*: The Risk Assessment assessed the human health risk from exposure to groundwater by current and future residential receptors if no action were taken. The risk is primarily due to the presence of vinyl chloride in the groundwater. Table 2.1 summarizes the risk associated with groundwater use.

2.7.1.1 *Identification of Chemicals of Concern (COCs)*: Table 2.2 provides the list of COCs for groundwater. The list of COCs includes VOCs and metals.

2.7.1.2 *Exposure Assessment*: Exposure pathways include ingestion, dermal contact, and inhalation. Total metals results were used in the assessment and the maximum detected concentrations were used as the groundwater exposure point concentration. See Tables 2.3 through 2.8.

2.7.1.3 *Uncertainty:* Uncertainties associated with this risk assessment are due to uncertainties in the risk assessment process in general (i.e., the toxicological database), specific uncertainties in characterizing the site, and uncertainties associated with describing exposures. This risk assessment is subject to uncertainty associated with such sources as sampling and analysis, exposure estimation, and toxicological data. Site-specific uncertainties for the TMSL site include current and future land uses, exposure pathways, selection of substances (effect of not including chemicals in the quantitative risk estimate because of missing toxicological information or elimination due to low concentration or frequency of detection).

2.7.2 *Ecological Risk Assessment*: An ecological risk assessment was conducted to qualitatively and quantitatively evaluate the effects of site-related contamination on terrestrial and aquatic organisms. Groundwater was not addressed as a separate risk factor in the ecological risk assessment because shallow groundwater discharges to Deer Creek and its associated wetlands. Exposure to COCs in groundwater would occur through the surface water pathway, not directly from groundwater. Terrestrial organisms associated with the site were not considered at risk, based on benchmark values taken from technical literature. Exposure and risk to aquatic organisms was evaluated by directly comparing surface water and sediment exposure dose to National Ambient Water Quality Criteria, state standards, and benchmark values taken from technical literature. Based on this analysis, cobalt and manganese in surface water were the only metals found that would potentially pose a risk to aquatic organisms. Actual damage to the aquatic and terrestrial ecosystem of Deer Creek and the adjacent wetlands were not observed. However, there is a possibility that future impacts could occur from the discharges of contaminated groundwater into the surface water system. Therefore, based on this analysis, ecological effects from TMSL contaminants are considered insignificant.

2.8 Remedial Action Objectives The Remedial Action Objectives (RAOs) for OU-2 are:

1) Protect human health and the environment from exposure to contaminated groundwater;

2) Protect existing and future residential water supplies from potential migration of VOC impacted groundwater; and

3) Reduce contaminant concentrations in groundwater to meet state groundwater standards within the aquifer in a reasonable time frame.

These RAOs were selected in order to establish acceptable exposure levels that are protective of human health and the environment.

2.9 Description of Alternatives The alternatives for this remedial action are assembled from screened technologies. The FS presented the following five alternatives.

Alternative 1 - No Action

Alternative 2 - Monitored Natural Attenuation

Alternative 3 - Oxygen Enhancement Using Oxygen Compound

Alternative 4 - Oxygen Enhancement Using Biosparging

Alternative 5 - Groundwater Pump and Treat

Description of Remedy Components: Groundwater monitoring and deed restrictions will be used in conjunction with all of the alternatives except Alternative 1.

Alternative 1 - No Further Action, entails continued operation of the OU-1 source control remedy with no further site action regarding groundwater monitoring or remediation. Site risk may be reduced through natural attenuation processes. However, the effectiveness would not be evaluated. This alternative is developed to act as a baseline to compare against all other alternatives. It will not meet the groundwater remedial action objectives.

No capital or Operation and Maintenance (O&M) costs would be incurred since no treatment technologies would be implemented:

Estimated Capital Cost: $ 0
Estimated Annual O&M Costs: $0
Estimated Total Present Worth: $0

Alternative 2 - Monitored Natural Attenuation (MNA), relies on natural processes (i.e, biodegradation, dispersion, dilution, sorption, volatilization, transformation or destruction) to achieve the remediation objectives. VOCs and natural attenuation parameters would be analyzed and evaluated through monitoring. The purpose of the long-term groundwater monitoring program will be to determine the effectiveness and protectiveness of MNA. To be considered adequately effective, it will be necessary for the data to demonstrate that the MNA remedy is performing to reduce contaminant concentrations, that the plume is shrinking, and that standards will be achieved in a reasonable period of time. If expansion occurs, then contingency actions would be initiated to control and prevent additional plume expansion. The predicted cleanup time frame is 40 to 50 years.

The total present worth of this alternative includes the capital costs and 50 years of O&M at a discount rate of eight percent.

Estimated Capital Cost: $165,000
Estimated Annual O&M Costs (Year 1-2): $188,000
Estimated Annual O&M Costs (Year 3-5): $117,000
Estimated Annual O&M Costs (Year 6-50): $219,000
Estimated Total Present Worth: $689,000

Alternative 3 - Oxygen Enhancement Using Oxygen Compound, involves creating an in-situ treatment zone across the leading edge of the plume and it incorporates the MNA alternative. In the treatment zone, a slow release oxygen compound is injected into the groundwater to enhance aerobic degradation of the VOCs. Approximately 50 to 55 permanent injection points would be installed. This alternative will prevent further migration. The predicted cleanup time frame is 40 to 50 years.

The total present worth of this alternative includes the capital costs and 50 years of O&M at a discount rate of eight percent.

Estimated Capital Cost: $581,914
Estimated Annual O&M Costs (Year 1-2): $631,000
Estimated Annual O&M Costs (Year 3-6): $870,000
Estimated Annual O&M Costs (Year 7-50): $182,000
Estimated Total Present Worth: $2,265,000

Alternative 4 - Oxygen Enhancement Using Biosparging, also involves creating an in-situ treatment zone across the leading edge of the plume to prevent further plume expansion and it incorporates MNA. In the treatment zone, air is injected into the groundwater at low flow rates to enhance aerobic degradation of the VOCs. Approximately 40 permanent injection points would be installed and the injections would occur over a period of six years. The predicted cleanup time frame is 40 to 50 years.

The total present worth of this alternative includes the capital costs and 50 years of O&M at a discount rate of eight percent.

Estimated Capital Cost: $894,758
Estimated Annual O&M Costs (Year 1-2): $303,000
Estimated Annual O&M Costs (Year 3-6): $347,000
Estimated Annual O&M Costs (Year 7-50): $182,000
Estimated Total Present Worth: $1,727,000

Alternative 5 - Groundwater Pump and Treat, involves the installation of a groundwater extraction and treatment system. Two to three extraction wells would be installed. These wells would provide hydraulic containment of impacted groundwater and remove VOCs. Extracted water would be routed to a treatment building located in the vicinity of the pumping wells for treatment prior to surface water discharge to Deer Creek. The

predicted cleanup time frame is 40 years.

The total present worth of this alternative includes the capital costs and 40 years of O&M at a discount rate of eight percent.

Estimated Capital Cost: $895,755
Estimated Annual O&M Costs (Year 1-2): $281,000
Estimated Annual O&M Costs (Year 3-6): $449,000
Estimated Annual O&M Costs (Year 7-40): $1,190,000
Estimated Total Present Worth: $2,816,000

2.10 Summary of Comparative Analysis of Remedy Alternatives In accordance with the NCP, the alternatives were evaluated by the US. EPA using nine criteria. For an alternative to be an acceptable remedy it must pass the U.S. EPA's two threshold criteria: 1) Overall Protective of Human Health and the Environment and 2) Compliance with Applicable and Relevant and Appropriate Requirements (ARARs). See Table 2.9 for the Summary of Detailed Analysis of Remedial Alternatives.

2.10.1 *Overall Protection of Human Health and the Environment* - With the exception of Alterative 1, all of the alternatives would provide adequate protection of human health and the environment.

2.10.2 *Compliance with ARARs* - With the exception of Alternative 1, all of the alternatives would be compliant with ARARs. A more detailed discussion of the ARARs for each alternative can be found in Section 3.0 of the FS. The ARARs for Alternative 2 are summarized in Table 2.15.

2.10.3 *Long-Term Effectiveness* - With the exception of Alternative 1, all of the alternatives would provide long-term effectiveness by reducing groundwater concentrations to the PALs.

2.10.4 *Reduction of Toxicity, Mobility or Volume through Treatment* - With the exception of Alternatives 1 and 2, all of the other alternatives provide a reduction of toxicity, mobility, or volume of the groundwater contaminants through treatment. Alternatives 1 and 2 provide a reduction of toxicity, mobility, or volume of the groundwater contaminants through natural processes.

2.10.5 *Short-Term Effectiveness* - None of the alternatives are considered as short-term remedies. Alternatives 2, 3, 4, and 5 are estimated to continue for 40 to 50 years. Risks to the community would not increase due to implementation of any of the alternatives. Alternative 2 would result in minimal impact to residential properties. Alternatives 3, 4, and 5 would result in significant impact to residential properties and cause potential

access issues. In addition, implementation of Alternatives 3, 4, and 5 may result in adverse effects to the surrounding wetlands. Risks to workers for Alternative 2 would be less than for Alternatives 3, 4, and 5. Alternative 2 requires as few as 15 monitoring wells; Alternatives 3 and 4 require over 40 injection points; and for Alternative 5, three extraction wells and piping to the treatment plant would be required. Alternative 5 would also require maintenance for a significantly longer period of time.

2.10.6 *Implementability* - Alternative 1 requires no implementation. Alternative 2 could be readily implemented. Alternatives 3, 4, and 5 would be more difficult to implement. Alternatives 3, 4, and 5 would require significant clearing of residential properties to install extraction wells, to install injection points, and to construct buildings.

2.10.7 *Cost* - Alternative 1 requires no additional cost to implement. Of the remaining alternatives, Alternative 2 would be the least expensive alternative to implement. Due to the high capital costs and long term O & M associated with Alternatives 3, 4, and 5 the cost to implement these technologies would be approximately three to four times the cost of Alternative 2. The detailed cost estimates can be found in Tables 2.10 through 2.13.[1]

2.10.8 *State Acceptance* - The State of Wisconsin's concurrence with the U.S. EPA's analysis and recommendation presented in the Proposed Plan is anticipated. The concurrence letter will be added to the Administrative Record upon receipt.

2.10.9 *Community Acceptance* - U.S. EPA received oral and written comments regarding the Proposed Plan. Community reaction to the Proposed Plan was mixed. See Section 3.0 and Appendix A - Responsiveness Summary for more details.

2.11 Principal Threat Wastes The "principal threat" concept is applied to the characterization of source material at a Superfund site. OU-2 applies only to the contaminated groundwater. Contaminated groundwater generally is not considered to be a source material, but non-aqueous phase liquid (NAPLs) may be viewed as source material. However, there are no source areas or NAPLs at OU-2 and as a result principal threat waste was not considered.

2.12 Selected Remedy U.S. EPA is selecting Alternative 2- MNA with institutional controls and contingency actions.

2.12.1 *Summary of Rationale for the Selected Remedy*: U.S. EPA believes Alternative 2 meets

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[1] The estimates are different from those in the Proposed Plan, but overall the differences do not amount to a significant change.

the threshold criteria and provides the best balance of tradeoff among the alternatives. U.S. EPA believes the selected remedy satisfies the following statutory requirements of CERCLA Section 121(b): (1) to be protective of human health and the environment; (2) to comply with ARARs; (3) to have long-term effectiveness and permanence; (4) to have short-term effectiveness; (5) to be implementable; and (6) to be cost effective.

U.S. EPA's conclusion that the TMSL site is a good candidate for monitored natural attenuation is supported by the Agency's guidance in this area, specifically: "Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites" (OSWER Directive 9200.4-17P), a U.S. EPA guidance document issued on April 21, 1999. The guidance sets forth a number of factors to consider in determining whether natural attenuation is appropriate for a given site:

> *Whether the contaminants present in soil or groundwater can be effectively remediated by natural attenuation processes.*

U.S. EPA believes that natural attenuation is occurring in groundwater because of the following indicators: (1) the absence of most of the other VOCs from the landfill, (2) the presence of natural break down products of VOCs, such as vinyl chloride, and (3) the presence of carbon dioxide and chloride, indicating the break down of vinyl chloride.

> *Whether or not the contaminant plume is stable and the potential for the environmental conditions that influence plume stability to change over time.*

The plume has not changed since the long-term monitoring program began in July 2000. The OU-1 source control measures have been effective in reducing the amount of contamination migrating into the groundwater. U.S. EPA does not foresee any likely change in the environmental conditions that would alter this situation.

> *Whether human health, drinking water supplies, other groundwaters, surface waters, ecosystems, sediments, air, or other environmental resources could be adversely impacted as a consequence of selecting MNA as the remedial option.*

U.S. EPA sees little possibility of an adverse impact on human health or drinking water supplies. Residents living south of the landfill and northeast of Deer Creek are connected to municipal water. Restrictive covenants to prohibit the installation of private wells are currently in-place on several properties adjacent to the landfill and similar restrictions will be placed on properties in the immediate area of the plume as part of the remedy. In the event of an unexpected, negative change in groundwater quality, U.S. EPA would have ample time to address it before contamination reached any potential receptors. Nor does U.S. EPA foresee an adverse impact on other groundwaters, surface waters,

ecosystems, sediments, air or other environmental resources as a result of choosing MNA. To date, U.S. EPA has not seen any impact of groundwater contamination at TMSL on surface waters, ecosystems, sediments, or other environmental resources. U.S. EPA sees no reason why this should change during the time natural attenuation continues to improve groundwater quality.

Current and projected demand for the affected resource over the time period that the remedy will remain in effect.

U.S. EPA is unaware of any demand for the groundwater within the 40-acre boundaries of TMSL and does not expect any change in demand over the time period that the remedy will remain in effect. The potential for future development in the plume area is unlikely because of the poor soil conditions, wetlands, accessability issues, and current zoning ordinances.

Whether the contamination, either by itself or as an accumulation with other nearby sources (on-site or off-site), will exert a long-term detrimental impact on available water supplies or other environmental resources.

U.S. EPA sees little possibility of this. Currently, no private wells are used in the affected areas and homes adjacent to the landfill are on municipal water. U.S. EPA therefore expects no long-term detrimental impact on available water supplies or other environmental resources.

Whether the estimated time frame of remediation is reasonable compared to time frames required for other more active methods.

MNA will be used to break down hazardous substances and contaminants in the groundwater thereby reducing the toxicity and volume of contamination. This will achieve the same beneficial results that an engineered treatment system would accomplish and in about the same time frame.

The nature and distribution of sources of contamination and whether these sources have been or can be adequately controlled.

The Source Control OU-1 remedy included capping the landfill, expanding the existing active gas collection system, and monitoring the effectiveness of the remedial action. The construction was completed in 2001. Based on data collected from gas probes and groundwater analytical data, the source control measures have been effective in eliminating landfill gas migration and reducing the volume of VOCs in groundwater. The groundwater data also shows that the relative dimensions of the plume have remained unchanged.

Whether the resulting transformation products present a greater risk due to increased toxicity and/or mobility than do the parent contaminants.

Vinyl chloride and benzene were the most frequently detected VOCs, but the benzene detected has not been as widespread as vinyl chloride. Vinyl chloride is indeed more toxic than any of the other VOC compounds, but the presence of carbon dioxide and chloride indicate that vinyl chloride is breaking down.

The impact of existing and proposed active remediation measures upon the monitored natural attenuation component of the remedy or the impact of remediation measures or other operations/activities in close proximity to the site.

The sole active component of the OU-1 remedy is the gas collection system. The system operates to remove VOCs from the unsaturated zone by extracting and venting landfill gases. U.S. EPA sees no negative effects on natural attenuation. U.S. EPA knows of no other operations/activities in close proximity to the site that might have an impact on natural attenuation.

Whether reliable site-specific mechanisms for implementing institutional controls (i.e., zoning ordinances) are available, and if an institution responsible for their monitoring and enforcement can be identified.

The types of institutional controls that have been and can be imposed include governmental controls, proprietary controls, and information devices:

Governmental controls have included eliminating private well use on property that has been connected to the City of Tomah's municipal water supply system. The City of Tomah, with assistance from the Township of LaGrange, intends to develop zoning restrictions or other ordinance measures that would limit or restrict the use of private residential wells in the affected areas.

Proprietary controls in the form of restrictive covenants are currently in place on the northern portion of the landfill property and two privately owned properties in the plume areas. The restrictions prohibit the installation of private wells. The City monitors and enforces these land use restrictions.

Information devices are currently in place insofar as the State of Wisconsin requires a variance for Wisconsin's well construction standards for the installation of private wells within a 1200 feet buffer zone around the TMSL. Under this requirement, a licensed Wisconsin well driller must determine if a new well installation is within the 1200 foot buffer zone. If the proposed area is within this zone, then the well driller would require

special approval from the WDNR to install a well in this area.

2.12.2 *Description of the Selected Remedy:* Groundwater would be monitored for VOCs, metals, and MNA indicator parameters. Newly installed and existing wells will be monitored. The groundwater parameters specified in the revised monitoring program approved by U.S. EPA and WDNR (July 2, 2001) will continue to be monitored. The purpose of the groundwater monitoring program will be to determine the effectiveness and protectiveness of MNA. To be considered adequately effective, it will be necessary for the data to demonstrate that the MNA remedy is performing to reduce contaminant concentrations, that the plume is shrinking, and that drinking water standards will be achieved in a reasonable period of time, projected to be 40 to 50 years. The time frame for evaluation of data to demonstrate the efficacy of MNA will be established in the remedial design. MNA as the OU-2 remedy would require contingency actions should an evaluation of the data demonstrate that MNA is not performing adequately.

Possible contingency actions could include:

- Collecting groundwater samples more frequently;
- Installing additional monitoring wells; and
- Implementing additional response actions, such as, a groundwater containment or treatment system.

The final cleanup levels are outlined in Table 2.14. These levels are based on the Wisconsin Preventive Action Limits (PALs) Ch. NR 140. The final list of contaminants is based on COCs identified in the risk assessment and data collected from the long-term monitoring program. Tetrachloroethene was not identified in the risk assessment, but it has been detected during the long-term monitoring and VAS study at levels above the Wisconsin PALs.

Deer Creek will also be monitored for VOCs and metals to determine if there is any impact from groundwater discharge. Future monitoring of environmental media (including surface water and groundwater from existing and new monitoring wells) and data evaluation will address potential impact on Deer Creek and the nearby wetlands and attainment of Water Quality Standards.

Institutional controls will be implemented to minimize future human exposure to impacted groundwater. The types of institutional controls that have been and can be imposed include governmental controls, proprietary controls, and information devices. The institutional control area is outlined in Figure 2-3.

At a minimum, institutional controls in the form of restrictive covenants will be implemented to minimize future human exposure to impacted groundwater. Restrictive covenants prohibiting groundwater from being used as a drinking water source and

prohibiting the installation of new wells will be recorded on deeds for property overlying the plume of contamination. Property owners could petition to have the restrictions removed once the groundwater meets Wisconsin standards. Other institutional controls such as zoning restrictions, easements giving regulators the right to enforce property restrictions, etc. will be considered during the Remedial Design process.

2.12.3 *Cost Estimate for the Selected Remedy*: The cost estimate for MNA was developed in the 2003 FS and is shown below. The total present worth of this potential alternative, including capital cost and assuming 50 years of O&M at a discount rate of eight percent is estimated at $689,000. A detailed break down of the cost can be found in Table 2.10.

2.12.4 *Estimated Outcomes of the Selected Remedy:* The estimated outcome of the selected remedy is to restore groundwater to drinking water standards in approximately 40 to 50 years.

The selected remedy will prevent people from drinking the contaminated groundwater until the cleanup levels are attained. The monitoring and contingency actions will also ensure that contaminant concentrations in the groundwater are decreasing and that the groundwater contamination does not expand significantly. The monitoring will also ensure that any increases in the levels of contaminants are not adversely affecting Deer Creek as the groundwater flows into the creek.

2.13 Statutory Determinations Under CERCLA 121 and the National Contingency Plan, 40 CFR Part 300, U.S. EPA must select remedies that: protect human health and the environment; comply with applicable or relevant and appropriate requirements, unless a statutory waiver is justified; are cost-effective; and utilize permanent solutions and alternatives treatment technologies or resources recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as a principal element. CERCLA also has a bias against off-site disposal of untreated wastes. This section discusses how the selected remedy meets these statutory requirements.

2.13.1 *Protection of Human Health and the Environment*: U.S. EPA believes that the selected remedy will protect human health and the environment through natural attenuation processes, institutional controls, monitoring, and if necessary, contingency actions.

The monitoring and contingency actions will ensure that contaminant concentrations in the groundwater are decreasing and that the groundwater contamination does not expand significantly. The monitoring will also ensure that any increases in the levels of contaminants are not adversely affecting Deer Creek as the groundwater flows into the creek.

2.13.2 *Compliance with Applicable and Relevant and Appropriate Requirements (ARARs):* U.S. EPA believes that the selected remedy will comply with ARARs. The ARARs are presented in more detail in Table 2.15.

2.13.3 *Other Criteria, Advisories, or Guidance To Be Considered (TBCs) for this Remedial Action*: In implementing remedies, U.S. EPA and the state often consider a number of non-binding criteria as criteria "to be considered" (TBCs). There were no TBCs at this site.

2.13.4 *Cost-Effectiveness:* In U.S. EPA's judgement, the selected remedy is cost-effective. Section 300.401(f)(1)(ii)(D) of the National Contingency Plan (NCP) requires U.S. EPA to determine cost-effectiveness by evaluating the cost of an alternative relative to its overall effectiveness. Alternative 2 would be the least expensive alternative to implement. Alternatives 3, 4, and 5 are more costly to implement, three to four times the cost of Alternative 2.

2.13.5 *Utilization of Permanent Solutions and Alternative Treatment Technologies (or Resource Recovery Technologies) to the Maximum Extent Practicable*: U.S. EPA believes that the selected remedy utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In this case, alternative treatment technologies were not practicable in that they were much more expensive than monitored natural attenuation, but they could not restore groundwater any faster.

2.13.6 *Preference for Treatment as a Principal Element:* The selected remedy will not satisfy the preference for remedial actions in which treatment permanently and significantly reduces the volume, toxicity, or mobility of hazardous substances, pollutants, and contaminants is a principal element since U.S. EPA does not consider natural attenuation to be "treatment." Nevertheless, MNA does break down hazardous substances and contaminants in the groundwater thereby reducing the toxicity and volume of contamination. This will achieve the same beneficial results that an engineered treatment system would accomplish in about the same time frame.

2.13.7 *Five-Year Review Requirements:* This remedy will result in hazardous substances remaining in the groundwater above levels that allow for unlimited use and unrestricted exposure. Therefore, U.S. EPA will conduct a review within five years after the initiation of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

2.13.7 *Construction Completion Listing:* U.S. EPA's selected remedy at this site does not require physical construction. Therefore, this site now qualifies for inclusion on the construction completion list.

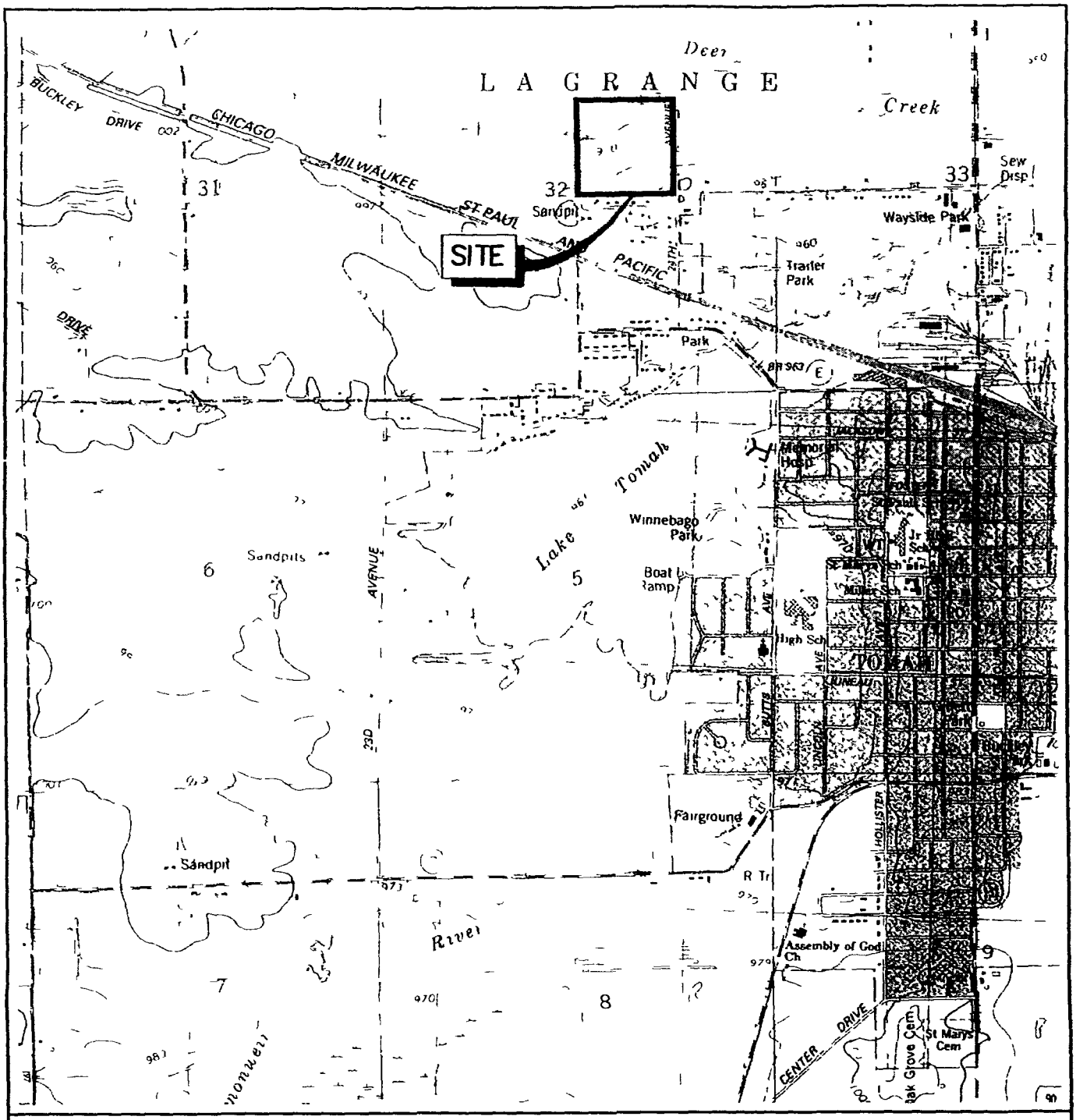
2.14 Documentation of Significant Changes The Proposed Plan for TMSL was issued for public comment on June 6, 2003. The Proposed Plan identified Alternative 2- MNA with institutional controls and contingency actions, as the preferred alternative for groundwater remediation. U.S. EPA reviewed all written and verbal comments submitted during the public comment period. It was determined that no significant changes to the remedy, as originally identified in the Proposed Plan, were necessary or appropriate.

PART 3: RESPONSIVENESS SUMMARY

3.1 Stakeholder Issues and EPA Responses The United States Environmental Protection Agency (U.S. EPA) received eleven written comments during the comment period and two verbal comments during the public meeting. The comments and U.S. EPA's responses are included in the Responsiveness Summary as Appendix A of this document. The City of Tomah and many of the citizens agreed with our selected remedy. Others expressed a preference for a more active treatment such as Alternatives 3, 4, or 5 because they felt these remedies would contain the contamination and reduce the threat to Deer Creek.

3.2 Technical and Legal Issues There are no technical or legal issues.

List of Figures



SOURCE. USGS TOPOGRAPHIC MAP
TOMAH, WIS QUADRANGLE

N

0 1000 2000ft

Figure 2-1

SITE LOCATION
TOMAH MUNICIPAL SANITARY LANDFILL
Tomah, Wisconsin

CRA

12865-80(030)GN-SP022 FEB 06/2003

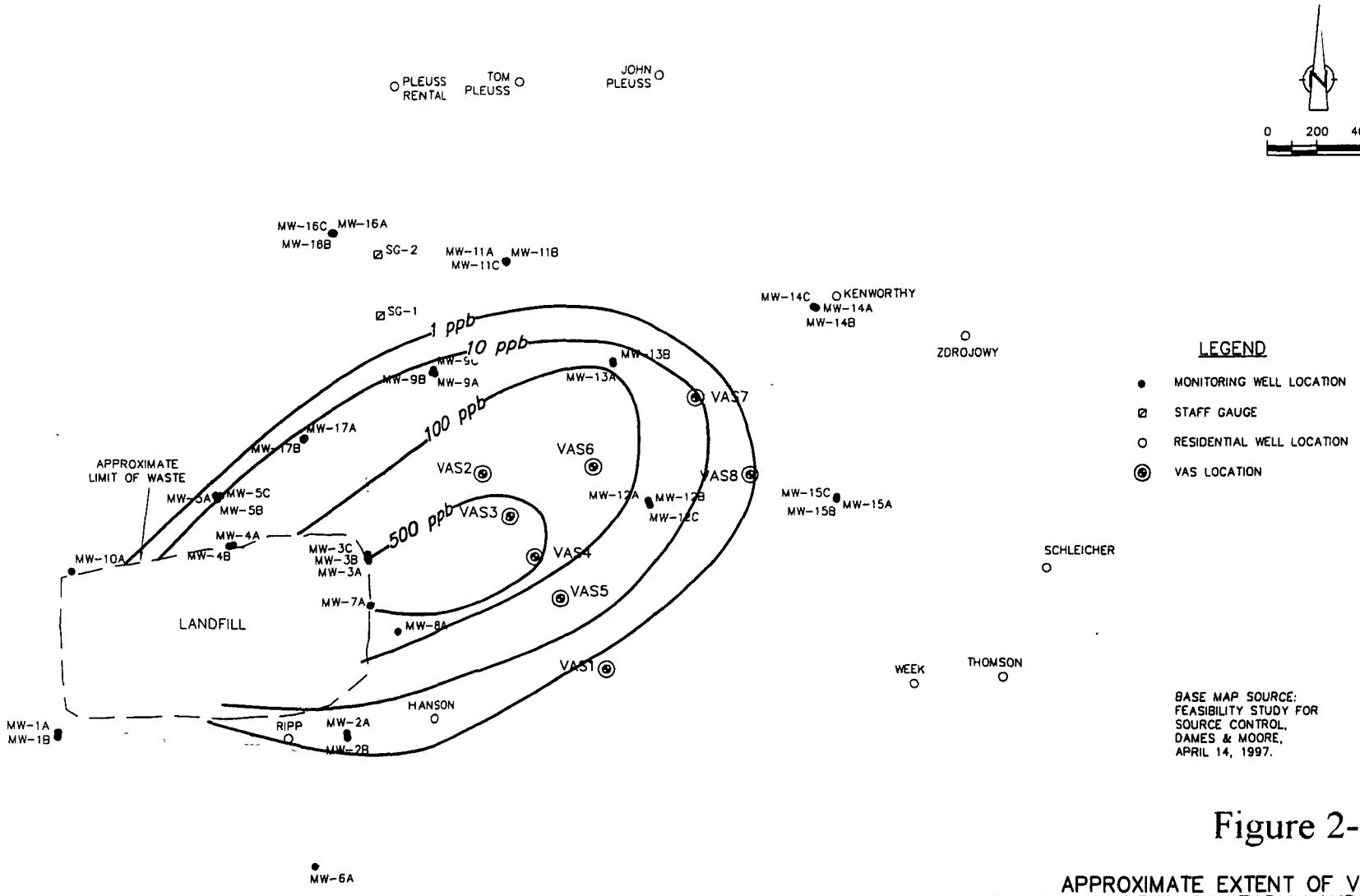


Figure 2-2

APPROXIMATE EXTENT OF VOCs
TOMAH MUNICIPAL SANITARY LANDFILL
Tomah, Wisconsin

CRA

12865-80(PRES005)GN-SP001 APR 22/2003

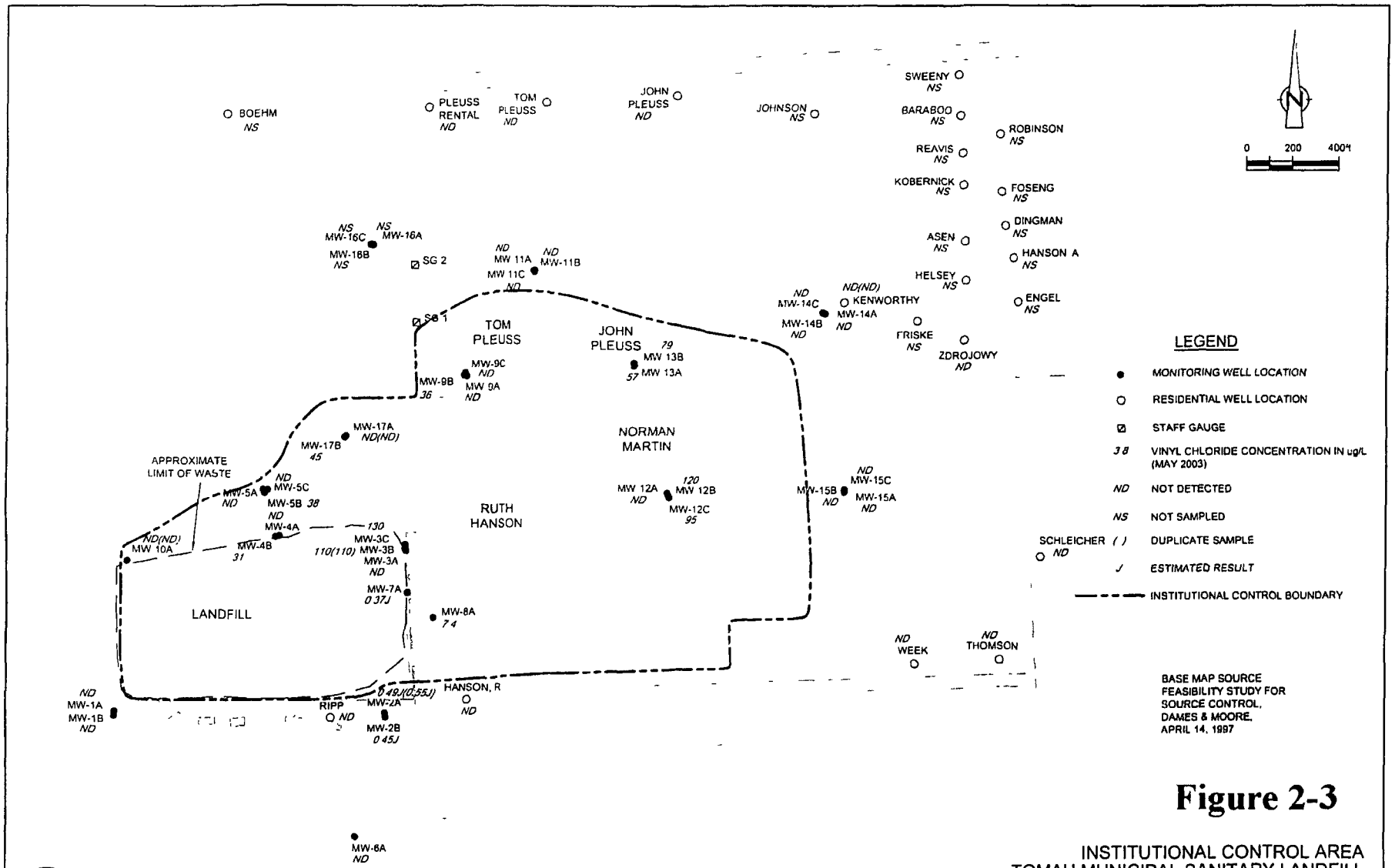


Figure 2-3

INSTITUTIONAL CONTROL AREA
TOMAH MUNICIPAL SANITARY LANDFILL
Tomah, Wisconsin

12865-80(BOON019)GN-SP001 SEP 08/2003

List of Tables

Table 2.1 Summary of Risk for Groundwater		
Receptor	**Cancer Risk**	**Hazard Risk**
Adult	3×10^{-2}	139
Child	1×10^{-2}	325

Table 2.2
Summary of Chemicals of Concern and Medium-Specific Exposure Point Concentrations

Chemical of Concern	Minimum Detected	Maximum Detected	Units	Frequency of Detection %	Exposure Point Concentration	Exposure Point Concentration Units
1,2-Dichloroethane	3 00	4 00	ug/l	25	4 00	ug/l
1,2-Dichloropropane	5 00	16 0	-	25	16 0	-
Benzene	5 00	48 0	-	62 5	48 0	-
Styrene	3 00	3 00	-	12 5	3 00	-
1,2-Dichloroethene Total	0 50	200	-	62 5	200	-
Vinyl Chloride	3 00	1200	-	100	1200	-
Arsenic	3 70	112	-	87 5	112	-
Cadmium	7 70	11 5	-	25	11 5	-
Chromium	2 0	320	-	87 5	320	-
Manganese	811	19000	-	100	19000	-
Thallium	3 1	20 7	-	62 5	20 7	-
Vanadium	1	233	-	100	233	-

Table 2.3
Cancer and Non-Cancer Toxicity Data Summary

Land Use: Residential
Exposure Route: Ingestion
Receptor: Residential Adult

Chemical of Concern	Cancer Risk	Non-Cancer Hazard Index	Oral Slope Factor (mg/kg/day)	Oral RfD (mg/kg/day)
1,2-Dichloroethane	4 3E-06	-	0 091	-
1,2-Dichloropropane	1 3E-05	-	0 068	-
Benzene	1 6E-05	-	0 029	
Styrene	8 7E-05	0 00041	2 47	0 2
1,2-Dichloroethene Total	-	0 60883	-	0 009
Vinyl Chloride	2 7E-02	-	1 9	-
Arsenic	2 0E-03	10 22831	1 5	0 0003
Cadmium	-	0 63014	-	0 0005
Chromium	-	1 75342	-	0 005
Manganese	-	104 10959	-	0 005
Thallium	-	7 08904	-	0 00008
Vanadium	-	0 91194	-	0 007

Table 2.4
Cancer and Non-Cancer Toxicity Data Summary

Land Use: Residential
Exposure Route: Ingestion
Receptor: Residential Child

Chemical of Concern	Cancer Risk	Non-Cancer Hazard Index	Oral Slope Factor (mg/kg/day)	Oral RfD (mg/kg/day)
1,2-Dichloroethane	2 0E-06	-	0 091	-
1,2-Dichloropropane	6 0E-06	-	0 68	-
Benzene	7 6E-06	-	0 029	-
Styrene	4 1E-05	-	2 47	0 2
1,2-Dichloroethene Total	-	1 42060	-	0 009
Vinyl Chloride	1 2E-02	-	1 9	-
Arsenic	9 2E-04	23 86606	1 5	0 0003
Cadmium	-	1 47032	-	0 0005
Chromium	-	4 09132	-	0 005
Manganese	-	242 92237	-	0 005
Thallium	-	16 541110	-	0 00008
Vanadium	-	2 12785	-	0 007

Table 2.5
Cancer and Non-Cancer Toxicity Data Summary

Land Use: Residential
Exposure Route: Inhalation
Receptor: Residential Adult

Chemical of Concern	Cancer Risk	Non-Cancer Hazard Index	Inhalation Slope Factor (mg/kg/day)	Inhalation RfD (mg/kg/day)
1,2-Dichloroethane	1.6E-07	-	0.091	-
1,2-Dichloropropane	-	0.01438	-	0.0011
Benzene	6.1E-07	-	0.02905	-
Styrene	-	0.00001	-	0.2857
Vinyl Chloride	1.6E-04		0.294	

Table 2.6
Cancer and Non-Cancer Toxicity Data Summary

Land Use: Residential
Exposure Route: Inhalation
Receptor: Residential Child

Chemical of Concern	Cancer Risk	Non-Cancer Hazard Index	Inhalation Slope Factor (mg/kg/day)	Inhalation RfD (mg/kg/day)
1,2-Dichloroethane	1.5E-07	-	0.091	-
1,2-Dichloropropane	-	0.06712	-	0.0011
Benzene	5.7E-07	-	0.02905	-
Styrene	-	0.00005	-	0.2857
Vinyl Chloride	1.4E-04	-	0.294	-

Table 2.7
Cancer and Non-Cancer Toxicity Data Summary

Land Use: Residential
Exposure Route: Dermal
Receptor: Residential Adult

Chemical of Concern	Cancer Risk	Non-Cancer Hazard Index	Oral Slope Factor (mg/kg/day)	Oral RfD (mg/kg/ day)	Adjusted Oral Slope Factor (mg/kg/ day)	Adjusted Oral RfD (mg/kg/ day)
1,2-Dichloroethane	6 5E-08	-	0 091	-	0 0910	-
1,2-Dichloropropane	5 9E-07	-	0 068	-	0 0680	
Benzene	1 0E-06	-	0 029	-	0 0299	-
Styrene	6 0E-06	0 00003	2 47	0 2	2 4700	0 2
1,2-Dichloroethene Total	-	0 01750	-	0 009	-	0 0090
Vinyl Chloride	5 8E-04	-	1 9	-	1 9000	-
Arsenic	6 0E-06	0 03095	1 5	0 0003	1 5789	0 0003
Cadmium	-	0 00181	-	0 0005	-	0 0005
Chromium	-	0 40329	-	0 005	-	0 0001
Manganese	-	0 29932	-	0 005	-	0 0050
Thallium	-	0 02038	-	0 00008	-	0 0001
Vanadium	-	0 00262	-	0 007	-	0 0070

Table 2.8
Cancer and Non-Cancer Toxicity Data Summary

Land Use: Residential
Exposure Route: Dermal
Receptor: Residential Child

Chemical of Concern	Cancer Risk	Non-Cancer Hazard Index	Oral Slope Factor (mg/kg/day)	Oral RfD (mg/kg/ day)	Adjusted Oral Slope Factor (mg/kg/ day)	Adjusted Oral RfD (mg/kg/ day)
1,2-Dichloroethane	2 8E-08	-	0 091	-	0 091	-
1,2-Dichloropropane	2 5E-07	-	0 068	-	0 068	
Benzene	4 4E-07	-	0 029	-	0 030	-
Styrene	2 6E-06	0 00006	2 47	0 2	2 470	0 2000
1,2-Dichloroethene Total	-	0 03765	-	0 009	-	0 009
Vinyl Chloride	2 5E-04	-	1 9	-	1 900	-
Arsenic	2 60E-06	0 06657	1 5	0 0003	1 579	0 000285
Cadmium	-	0 00390	-	0 0005	-	0 0005
Chromium	-	0 86736	-	0 005	-	0 0000625
Manganese	-	0 64374	-	0 005	-	0 005
Thallium	-	0 04383	-	0 00008	-	0 00008
Vanadium	-	0 00564	-	0 007	-	0 007

TABLE 2.9
SUMMARY OF DETAILED ANALYSIS OF REMEDIAL ALTERNATIVES

Criteria	*Alternative 1* *No Action*	*Alternative 2* *Monitored Natural Attenuation*	*Alternative 3* *Oxygen Enhancement* *Using Oxygen Compound*	*Alternative 4* *Oxygen Enhancement* *Using Biosparging*	*Alternative 5* *Groundwater Pump and Treat*
Overall Protection of Human Health and the Environment	Not Applicable	Protective of human health and the environment. Effective in reducing contaminant toxicity and the risks of exposure Institutional controls and additional monitoring wells upgradient of existing residential wells would eliminate exposure risks	Protective of human health and the environment. Effective in reducing contaminant toxicity and the risks of exposure Institutional controls and additional monitoring wells upgradient of existing residential wells would eliminate exposure risks	Protective of human health and the environment. Effective in reducing contaminant toxicity and the risks of exposure Institutional controls and additional monitoring wells upgradient of existing residential wells would eliminate exposure risks	Protective of human health and the environment. Effective in reducing contaminant toxicity and the risks of exposure Institutional controls and additional monitoring wells upgradient of existing residential wells would eliminate exposure risks
Compliance with ARARs	Not compliant with action-specific ARARs Groundwater concentrations above standards would not be monitored May be compliant with chemical specific ARARs although effectiveness would not be monitored Compliant with location specific ARARs	Compliant with action-, location-, and chemical-specific ARARs Compliance is expected to be achieved in 40-50 years	Compliant with action-, location-, and chemical-specific ARARs Compliance is expected to be achieved in 40-50 years	Compliant with action-, location-, and chemical-specific ARARs Compliance is expected to be achieved in 40-50 years	Compliant with action-, location-, and chemical-specific ARARs Compliance is expected to be achieved in 30-40 years
Long-Term Effectiveness	Natural processes would be effective in reducing contaminant toxicity Effectiveness would not be evaluated through monitoring	Long-term risk would be reduced through natural degradation of contaminants to remedial objectives	Long-term risk would be reduced through natural degradation of contaminants to remedial objectives	Long-term risk would be reduced through natural degradation of contaminants to remedial objectives	Long-term risk would be reduced through natural degradation of contaminants to remedial objectives
Reduction of Toxicity, Mobility, or Volume through Treatment	Natural processes would be effective in reducing contaminant toxicity, mobility and volume, but not through treatment. Effectiveness would not be evaluated through monitoring	Effectively reduces toxicity, mobility and volume over time through natural processes, but not through treatment	Effectively reduces toxicity, mobility and volume over time through enhanced natural processes	Effectively reduces toxicity, mobility and volume over time through enhanced natural processes	Effectively reduces toxicity, mobility and volume over time through hydraulic capture and extraction and treatment of impacted groundwater
Short Term Effectiveness	No increase in short-term risk would be realized	Minimal risk incurred during installation of additional monitoring wells	Minimal risk incurred during installation of additional monitoring wells and injection points Active remedy which may reduce remediation time frame Groundwater monitoring will evaluate the effectiveness	Minimal risk incurred during installation of additional monitoring wells and injection points Active remedy which may reduce remediation time frame. Groundwater monitoring will evaluate the effectiveness	Minimal risk incurred during installation of additional monitoring wells, extraction wells, and treatment system construction Active remedy which will reduce remediation time frame Groundwater monitoring will evaluate the effectiveness
Implementability	*No implementation required*	*Monitoring wells are readily implementable* Some tree removal may be required to gain access Some concern with property access issues	*Difficult to implement due to terrain and* number of injection points (50 - 55) Tree removal will be required Property access issues would be of high concern	*Difficult to implement due to terrain and* number of injection points (40). Tree removal will be required Property access issues would be of high concern.	Moderately difficult to implement due to terrain Tree removal is likely Property access issues would be of high concern
Cost	Present Worth - $0	Present Worth - $689 000	Present Worth - $2,265,000	Present Worth - $1,727,000	Present Worth - $2,816,000

Table 2.10

COST ESTIMATE
ALTERNATIVE 2 - MONITORED NATURAL ATTENUATION
TOMAH MUNICIPAL SANITARY LANDFILL
TOMAH, WISCONSIN

Description	*Units*	*Quantity*	*Unit Price*	*Total*
Part I: Capital				
Direct Costs				
Site Preparation/Clearing	LS	1	$ 20,000	$ 20,000
Install Additional Groundwater Monitoring Wells (Assume an average depth of 70 ft)	EA	15	$ 5,000	$ 75,000
Indirect Costs				
Implement Deed Restrictions	LS	1	$ 12,000	$ 12,000
Health & Safety	LS	1	$ 3,000	$ 3,000
Monitoring Well Installation Oversight	HR	300	$ 75	$ 22,500
Engineering & Reporting	LS	1	$ 5,000	$ 5,000
			Subtotal	$ 137,500
Contingencies	20%			$ 27,500
		Total Capital Cost Estimate		**$ 165,000**
Part II: Annual Operations and Maintenance				
Groundwater Monitoring (Quarterly Sampling): Year 1-2				
Field Personnel (4 events/yr)	HR	360	$ 75	$ 27,000
Vehicles and Field Equipment (4 events/yr)	EA	4	$ 1,000	$ 4,000
Groundwater Analysis (VOCs)	EA	140	$ 150	$ 21,000
Groundwater Analysis (Metals, Cl)	EA	108	$ 35	$ 3,780
Monitoring for Natural Attenuation Parameters (2/	EA	40	$ 300	$ 12,000
Quarterly Reporting	EA	4	$ 5,000	$ 20,000
			Subtotal	$ 87,780
Contingencies	20%			$ 17,556
			Total Annual O & M Cost Estimate	$ 105,336
			Present Value (8% over 2 years)	$187,842
			Present Worth (Rounded)	**$188,000**

Table 2.10

COST ESTIMATE
ALTERNATIVE 2 - MONITORED NATURAL ATTENUATION
TOMAH MUNICIPAL SANITARY LANDFILL
TOMAH, WISCONSIN

Groundwater Monitoring (Semi-Annual Sampling): Year 3-5

Field Personnel (2 events/yr)	HR	180	$ 75	$ 13,500
Vehicles and Field Equipment (2 events/yr)	EA	2	$ 1,000	$ 2,000
Groundwater Analysis (VOCs)	EA	71	$ 150	$ 10,650
Groundwater Analysis (Metals, Cl)	EA	55	$ 35	$ 1,925
Monitoring for Natural Attenuation Parameters	EA	20	$ 300	$ 6,000
Semi-Annual Reporting	EA	2	$ 5,000	$ 10,000
			Subtotal	$ 44,075
Contingencies	20%			$ 8,815
			Total Annual O & M Cost Estimate	$ 52,890
			Present Value (8% over 3 years)	$116,852
			Present Worth (Rounded)	**$117,000**

Groundwater Monitoring (Annual Sampling): Year 6-50

Field Personnel (1 event/yr)	HR	90	$ 75	$ 6,750
Vehicles and Field Equipment (1 events/yr)	EA	1	$ 1,000	$ 1,000
Groundwater Analysis (VOCs)	EA	36	$ 150	$ 5,400
Groundwater Analysis (Metals, Cl)	EA	28	$ 35	$ 980
Monitoring for Natural Attenuation Parameters	EA	10	$ 300	$ 3,000
Annual Reporting	EA	1	$ 5,000	$ 5,000
			Subtotal	$ 22,130
Contingencies	20%			$ 4,426
			Total Annual O & M Cost Estimate	$ 26,556
			Present Value (8% over 45 years)	$218,847
			Present Worth (Rounded)	**$219,000**
			Total Present Worth (Rounded)	**$689,000**

Table 2.11

COST ESTIMATE
ALTERNATIVE 3 - OXYGEN ENHANCEMENT USING OXYGEN COMPOUND
TOMAH MUNICIPAL SANITARY LANDFILL
TOMAH, WISCONSIN

Description	*Units*	*Quantity*	*Unit Price*	*Total*
Part I: Capital				
Direct Costs				
Site Preparation/Clearing	LS	1	$ 60,000	$ 60,000
Install Additional Groundwater Monitoring Wells (Assume an average depth of 70 ft)	EA	15	$ 5,000	$ 75,000
[1]Injection Points/Oxygen Compound	LS	1	$199,620	$ 199,620
Indirect Costs				
Implement Deed Restrictions	LS	1	$ 12,000	$ 12,000
Health and Safety	LS	1	$ 3,000	$ 3,000
Monitoring Well Installation Oversight	HR	300	$ 75	$ 22,500
Injection Point Installation Oversight	HR	300	$ 75	$ 22,500
Pilot Testing	LS	1	$ 50,000	$ 50,000
Reimbursement to property owners	LS	1	$ 10,000	$ 10,000
			Subtotal	$ 454,620
Contingencies	20%			$ 90,924
Design	8%			$ 36,370
		Total Capital Cost Estimate		**$ 581,914**
Part II: Annual Operations and Maintenance				
Groundwater Monitoring & Injection (Quarterly Sampling/Semi-Annual Injection): Year 1-2				
Field Personnel (4 events/yr)	HR	400	$ 75	$ 30,000
Vehicles and Field Equipment (4 events/yr)	EA	4	$ 1,000	$ 4,000
Groundwater Analysis (VOCs)	EA	142	$ 150	$ 21,300
Groundwater Analysis (Metals, Cl)	EA	110	$ 35	$ 3,850
Oxygen Compound (Semi-Annual Re-Injection)	EA	2	$ 82,620	$ 165,240
Injection Subcontractor	HR	440	$ 115	$ 50,600
Quarterly Reporting	EA	4	$ 5,000	$ 20,000
			Subtotal	$ 294,990
Contingencies	20%			$ 58,998
		Total Annual O & M Cost Estimate		$ 353,988
		Present Value (8% over 2 years)		$ 631,254
		Present Worth (Rounded)		**$ 631,000**

Table 2.11

COST ESTIMATE
ALTERNATIVE 3 - OXYGEN ENHANCEMENT USING OXYGEN COMPOUND
TOMAH MUNICIPAL SANITARY LANDFILL
TOMAH, WISCONSIN

Groundwater Monitoring & Injection (Semi-Annual Sampling/Semi-Annual Injection): Year 3-6

Field Personnel (2 events/yr)	HR	200	$ 75	$ 15,000
Vehicles and Field Equipment (2 events/yr)	EA	2	$ 1,000	$ 2,000
Groundwater Analysis (VOCs)	EA	71	$ 150	$ 10,650
Groundwater Analysis (Metals, Cl)	EA	55	$ 35	$ 1,925
Oxygen Compound (Semi-Annual Re-Injection)	EA	2	$ 82,620	$ 165,240
Injection Subcontractor	HR	440	$ 115	$ 50,600
Semi-Annual Reporting	LS	2	$ 5,000	$ 10,000
			Subtotal	$ 255,415
Contingencies	20%			$ 51,083
			Total Annual O & M Cost Estimate	$ 306,498
			Present Value (8% over 4 years)	$ 870,297
			Present Worth (Rounded)	**$ 870,000**

Groundwater Monitoring & Injection (Annual Sampling/Annual Injection): Year 7-50

Field Personnel (1 event/yr)	HR	100	$ 75	$ 7,500
Vehicles and Field Equipment (1 event/yr)	EA	1	$ 1,000	$ 1,000
Groundwater Analysis (VOCs)	EA	36	$ 150	$ 5,400
Groundwater Analysis (Metals, Cl)	EA	28	$ 35	$ 980
Oxygen Compound (Annual Re-Injection)	EA	0	$ 82,620	$ -
Injection Subcontractor	HR	0	$ 115	$ -
Annual Reporting	LS	1	$ 5,000	$ 5,000
			Subtotal	$ 19,880
Contingencies	20%			$ 3,976
			Total Annual O & M Cost Estimate	$ 23,856
			Present Value (8% over 44 years)	$ 181,567
			Present Worth (Rounded)	**$ 182,000**
			Total Present Worth (Rounded)	**$ 2,265,000**

Notes:

[1] Based on ORC Design Software for Barriers Using Slurry Injection, Regenesis Software Version 3.1 (See Attachment)

Table 2.12

COST ESTIMATE
ALTERNATIVE 4 - OXYGEN ENHANCEMENT USING BIOSPARGING
TOMAH MUNICIPAL SANITARY LANDFILL
TOMAH, WISCONSIN

Description	*Units*	*Quantity*	*Unit Price*	*Total*
Part I: Capital				
Direct Costs				
Site Preparation/Clearing	LS	1	$ 60,000	$ 60,000
Install Additional Groundwater Monitoring Wells (Assume an average depth of 70 ft)	EA	15	$ 5,000	$ 75,000
Install Nested Injection Points (one borehole with two screen intervals)	EA	40	$ 5,000	$ 200,000
Building Construction	LS	1	$100,000	$ 100,000
Trenching	LS	1	$ 30,000	$ 30,000
Electrical (power service, wiring, lighting, grounding)	LS	1	$ 30,000	$ 30,000
Mechanical (piping, hvac, insulation)	LS	1	$ 5,000	$ 5,000
Equipment (2 Compressors)	LS	1	$ 6,000	$ 6,000
Instruments (flow, pressure)	LS	1	$ 3,000	$ 3,000
PLC/SCADA	LS	1	$ 15,000	$ 15,000
Indirect Costs				
Implement Deed Restrictions	LS	1	$ 12,000	$ 12,000
Startup and Commissioning	LS	1	$ 10,000	$ 10,000
Health and Safety	LS	1	$ 3,000	$ 3,000
Monitoring Well Installation Oversight	HR	300	$ 75	$ 22,500
Injection Point Installation Oversight	HR	400	$ 75	$ 30,000
Construction Oversight	HR	150	$ 75	$ 11,250
Pilot Testing	LS	1	$ 50,000	$ 50,000
Reimbursement to property owners	LS	1	$ 10,000	$ 10,000
			Subtotal	$ 672,750
Contingencies	20%			$ 134,550
Design	8%			$ 53,820
Construction Inspection & Reportir :	5%			$ 33,638
		Total Capital Cost Estimate		**$ 894,758**

Table 2.12

COST ESTIMATE
ALTERNATIVE 4 - OXYGEN ENHANCEMENT USING BIOSPARGING
TOMAH MUNICIPAL SANITARY LANDFILL
TOMAH, WISCONSIN

Part II: Annual Operations and Maintenance

Groundwater Monitoring & Biosparging (Quarterly Sampling): Year 1-2

Field Personnel (4 events/yr)	HR	400	$ 75	$ 30,000
Vehicles and Field Equipment (4 events/yr)	EA	4	$ 1,000	$ 4,000
Groundwater Analysis (VOCs)	EA	142	$ 150	$ 21,300
Groundwater Analysis (Metals, Cl)	EA	110	$ 35	$ 3,850
Electricity (2 compressors) (40 hp x 0.75 kw/hp x 8760 hr/yr)	KWHR	262,800	$ 0.10	$ 26,280
System Operation & Maintenance	Monthly	12	$ 3,000	$ 36,000
Quarterly Reporting	EA	4	$ 5,000	$ 20,000
			Subtotal	$ 141,430
Contingencies	20%			$ 28,286
			Total Annual O & M Cost Estimate	$ 169,716
			Present Value (8% over 2 years)	$ 302,649
			Total Present Worth (Rounded)	**$ 303,000**

Groundwater Monitoring & Biosparging (Semi-Annual Sampling): Year 3-6

Field Personnel (2 events/yr)	HR	200	$ 75	$ 15,000
Vehicles and Field Equipment (2 events/yr)	EA	2	$ 1,000	$ 2,000
Groundwater Analysis (VOCs)	EA	71	$ 150	$ 10,650
Groundwater Analysis (Metals, Cl)	EA	55	$ 35	$ 1,925
Electricity (2 compressors) (40 hp x 0.75 kw/hp x 8760 hr/yr)	KWHR	262,800	$ 0.10	$ 26,280
System Operation & Maintenance	Monthly	12	$ 3,000	$ 36,000
Semi-Annual Reporting	LS	2	$ 5,000	$ 10,000
			Subtotal	$ 101,855
Contingencies	20%			$ 20,371
			Total Annual O & M Cost Estimate	$ 122,226
			Present Value (8% over 4 years)	$ 347,059
			Present Worth (Rounded)	**$ 347,000**

Groundwater Monitoring & Biosparging (Annual Sampling): Year 7-50

Field Personnel (1 event/yr)	HR	100	$ 75	$ 7,500
Vehicles and Field Equipment (1 event/yr)	EA	1	$ 1,000	$ 1,000
Groundwater Analysis (VOCs)	EA	36	$ 150	$ 5,400
Groundwater Analysis (Metals, Cl)	EA	28	$ 35	$ 980
Electricity (2 compressors) (40 hp x 0.75 kw/hp x 8760 hr/yr)	KWHR	0	$ 0.10	$ -
System Operation & Maintenance	Monthly	0	$ 3,000	$ -
Annual Reporting	LS	1	$ 5,000	$ 5,000
			Subtotal	$ 19,880
Contingencies	20%			$ 3,976
			Total Annual O & M Cost Estimate	$ 23,856
			Present Value (8% over 44 years)	$ 181,567
			Present Worth (Rounded)	**$ 182,000**
			Total Present Worth (Rounded)	**$ 1,727,000**

Table 2.13

COST ESTIMATE
ALTERNATIVE 5 - PUMP AND TREAT
TOMAH MUNICIPAL SANITARY LANDFILL
TOMAH, WISCONSIN

Description	*Units*	*Quantity*	*Unit Price*	*Total*
Part I: Capital				
Direct Costs				
Site Preparation/Clearing	LS	1	$ 80,000	$ 80,000
Install Additional Groundwater Monitoring Wells (Assume an average depth of 70 ft)	EA	15	$ 5,000	$ 75,000
Extraction Wells	EA	2	$ 20,000	$ 40,000
Building Construction	LS	1	$100,000	$ 100,000
Trenching/Discharge Piping	LS	1	$ 50,000	$ 50,000
Electrical (power service, wiring, lighting, grounding	LS	1	$ 50,000	$ 50,000
Mechanical (piping, hvac, insulation)	LS	1	$ 40,000	$ 40,000
Pumps and blowers	LS	1	$ 7,000	$ 7,000
Tanks (Equalization)	LS	1	$ 5,000	$ 5,000
Process Equipment (air stripper,bag filter)	LS	1	$ 52,000	$ 52,000
Instruments (flow, level, pressure)	LS	1	$ 10,000	$ 10,000
PLC/SCADA	LS	1	$ 30,000	$ 30,000
Indirect Costs				
Implement Deed Restrictions	LS	1	$ 12,000	$ 12,000
Startup and Commissioning	LS	1	$ 10,000	$ 10,000
Health and Safety	LS	1	$ 5,000	$ 5,000
Monitoring Well Installation Oversight	HR	300	$ 75	$ 22,500
Construction Oversight	HR	200	$ 75	$ 15,000
Pumping Test	LS	1	$ 50,000	$ 50,000
Permitting	LS	1	$ 10,000	$ 10,000
Reimbursement to property owners	LS	1	$ 10,000	$ 10,000
			Subtotal	$ 673,500
Contingencies	20%			$ 134,700
Design	8%			$ 53,880
Construction Inspection & Reporting	5%			$ 33,675
		Total Capital Cost Estimate		**$ 895,755**

Table 2.13

COST ESTIMATE
ALTERNATIVE 5 - PUMP AND TREAT
TOMAH MUNICIPAL SANITARY LANDFILL
TOMAH, WISCONSIN

Part II: Annual Operations and Maintenance

Groundwater Monitoring & Pump & Treat (Quarterly Sampling): Year 1-2

Field Personnel (4 events/yr)	HR	400	$ 75	$ 30,000
Vehicles and Field Equipment (4 events/yr)	EA	4	$ 1,000	$ 4,000
Groundwater Analysis (VOCs)	EA	144	$ 150	$ 21,600
Groundwater Analysis (Metals, Cl)	EA	110	$ 35	$ 3,850
Electricity (2 well pumps, 2 transfer pumps, 1 blower (45 hp x 0.75 kw/hp x 8760 hr/yr)	KWHR	295,650	$ 0.10	$ 29,565
Influent/Effluent Sampling (VOCs & Metals)	Monthly	12	$ 200.00	$ 2,400
Operation and Maintenance	Monthly	4	$ 5,000	$ 20,000
Quarterly Reporting	EA	4	$ 5,000	$ 20,000
			Subtotal	$ 131,415
Contingencies	20%			$ 26,283
			Total Annual O & M Cost Estimate	$ 157,698
			Present Value (8% over 2 years)	$ 281,217
			Present Worth (Rounded)	**$ 281,000**

Groundwater Monitoring & Pump & Treat (Semi-Annual Sampling): Year 3-6

Field Personnel (2 events/yr)	HR	200	$ 75	$ 15,000
Vehicles and Field Equipment (2 events/yr)	EA	2	$ 1,000	$ 2,000
Groundwater Analysis (VOCs)	EA	72	$ 150	$ 10,800
Groundwater Analysis (Metals, Cl)	EA	55	$ 35	$ 1,925
Electricity (2 well pumps, 2 transfer pumps, 1 blower (45 hp x 0.75 kw/hp x 8760 hr/yr)	KWHR	295,650	$ 0.10	$ 29,565
Influent/Effluent Sampling (VOCs & Metals)	Monthly	12	$ 200.00	$ 2,400
System Operation & Maintenance	Monthly	12	$ 5,000	$ 60,000
Semi-Annual Reporting	LS	2	$ 5,000	$ 10,000
			Subtotal	$ 131,690
Contingencies	20%			$ 26,338
			Total Annual O & M Cost Estimate	$ 158,028
			Present Value (8% over 4 years)	$ 448,718
			Present Worth (Rounded)	**$ 449,000**

Groundwater Monitoring & Pump & Treat (Annual Sampling): Year 7-40

Field Personnel (1 event/yr)	HR	100	$ 75	$ 7,500
Vehicles and Field Equipment (1 event/yr)	EA	1	$ 1,000	$ 1,000
Groundwater Analysis (VOCs)	EA	36	$ 150	$ 5,400
Groundwater Analysis (Metals, Cl)	EA	28	$ 35	$ 980
Electricity (2 well pumps, 2 transfer pumps, 1 blower (45 hp x 0.75 kw/hp x 8760 hr/yr)	KWHR	295,650	$ 0.10	$ 29,565
Influent/Effluent Sampling (VOCs & Metals)	Monthly	12	$ 200.00	$ 2,400
System Operation & Maintenance	Monthly	12	$ 7,000	$ 84,000
Annual Reporting	LS	1	$ 5,000	$ 5,000
			Subtotal	$ 135,845
Contingencies	20%			$ 27,169
			Total Annual O & M Cost Estimate	$ 163,014
			Present Value (8% over 34 years)	$ 1,190,342
			Present Worth (Rounded)	**$ 1,190,000**
			Total Present Worth (Rounded)	**$ 2,816,000**

Table 2.14
Groundwater Cleanup Standards
Tomah Municipal Sanitary Landfill

Compound	Standard[1] (parts per billion)
1,2-Dichloroethane	0.5
1,2-Dichloropropane	0.5
Benzene	0.5
Styrene	10
Cis-1,2-Dichloroethene	7.0
Tetrachloroethene	0.5
Vinyl Chloride	0.02
Arsenic	5.0
Cadmium	0.5
Chromium	10
Manganese	25
Thallium	0.4
Vanadium	6.0

Notes: ppb: "parts per billion" or ug/L

[1] Preventive Action Limits (PALs) under Ch. NR 140.

The State has also promulgated ground-water quality standards in Ch. NR 140, which the WDNR is consistently applying to all facilities, practices, and activities which are regulated by the WDNR and which may affect ground-water in the State.

SUMMARY OF ARARS FOR ALTERNATIVE 2
TOMAH MUNICIPAL SANITARY LANDFILL
TOMAH, WISCONSIN

ARAR	REQUIREMENT/PURPOSE	ALTERNATIVE 2
CHEMICAL SPECIFIC		
Federal		
Federal Safe Drinking Water Maximum Contaminant Levels (MCLs), 40 CFR Part 141	Maximum contaminant Levels for Public Water Systems	Relevant and appropriate to ground water that is or could be used for drinking water
State		
Ch NR 105	Establishes surface water quality criteria and secondary values for toxic substances	Applicable to surface waters of the state
Ch NR 809	Establishes surface water quality criteria and secondary values for toxic substances	Relevant and appropriate to groundwater that is or could be used for drinking water
Groundwater Quality, NR 140	Establishes groundwater quality standards for substances detected in groundwater	Applicable to facility practices and activities which may effect groundwater quality
LOCATION SPECIFIC		
Federal		
Executive Order Protecting Wetlands, Executive Order 11990, Section 2, 40 CFR 6 302 (a)	Requires federal agencies to minimize the destruction, loss, or degradation of wetlands	Relevant and appropriate to remediation activities taking place in and around wetlands
Statement of Procedures on Floodplain Management and Wetlands Protection, 40 CFR Part 6, Appendix A	Procedures for USEPA to avoid impacts associated with the destruction of wetlands and the occupancy and modification of floodplains and wetlands	Relevant and appropriate to remediation activities taking place in and around wetlands and within floodplain
State		
Ch NR 103 (This could also be chemical specific)	Established water quality standards for wetlands	Applcable to all determinations that affect wetlands
ACTION SPECIFIC		
State		
Ch NR 605 08 (This could also be chemical specific)	Identification & listing of hazardous waste Provides standards for identifying waste as hazardous based on characteristics	Applicable to wastes generated during remedial action
Ch NR 610	Specifies the requirements that apply to small quantity and very small quantity generators of hazardous waste	Potentially applicable if remedial action generates hazardous waste
Ch NR 615	Specifies the requirements that apply to the generators of large quantities of hazardous waste	Potentially applicable if remedial action generates hazardous waste

SUMMARY OF ARARS FOR ALTERNATIVE 2
TOMAH MUNICIPAL SANITARY LANDFILL
TOMAH, WISCONSIN

ARAR	REQUIREMENT/PURPOSE	ALTERNATIVE 2
Ch NR 630	Specifies the general requirements that apply to the storage, treatment and disposal of hazardous waste	Potentially applicable if remedial action generates hazardous waste, which is treated on-site
Ch NR 630 04(18)	Exemption to allow generators to treat own waste on-site	Potentially applicable if remedial action generates hazardous waste that is treated on-site
Ch NR 630 04(2)	Exemption from NR 630 for POTW which accepts hazardous wastes for treatment or recycling	Potentially applicable if remedial action gnerates hazardous waste that is sent to POTW
Ch NR 724	Specifies the requirement for the design, implementation, operation, maintenance and monitoring of the remedial action	Applicable to the remedial action
Groundwater Monitoring Well Requirements, NR 141	Provides standards for design, construction, installation, abandonment, and documentation of groundwater monitoring wells	Applicable to modifications and maintenance of the monitoring well network

APPENDIX A

Responsiveness Summary

Appendix A
United States Environmental Protection Agency's Responsiveness Summary

The purpose of the Responsiveness Summary is to provide a summary of the comments the United States Environmental Protection Agency (U.S. EPA) received from the public on the Proposed Plan and Administrative Record for the Tomah Municipal Sanitary Landfill (TMSL) Superfund Site, Tomah, Wisconsin, and to present U.S. EPA's responses to the comments. This Proposed Plan was issued June 6, 2003. The public comment period for the Proposed Plan was initially set to run from June 10, 2003 to July 10, 2003, but was extended until July 24, 2003. A public meeting was held June 24, 2003 at Tomah's City Hall. The meeting was divided into two parts. In the first part of the meeting, U.S. EPA explained its proposed remedial action and answered questions. In the second part of the meeting, U.S. EPA received formal public comments that are addressed in this responsiveness summary. The entire proceedings of the meeting were transcribed by a court reporter and are being included in the final Administrative Record.

U.S. EPA received two kinds of comments: 1) written comments received during the public comment period and 2) formal oral comments received at the public meeting. U.S. EPA is required by law to consider and address only those comments that are pertinent and significant to the remedial action being selected. U.S. EPA is not required to address comments which pertain to the allocation of liability for the remedial action, nor potential enforcement actions to implement the remedial action, as these are independent of the selection of the remedial action and U.S. EPA's Proposed Plan.

U.S. EPA is not required to reprint the comments of the commenter verbatim and may paraphrase where appropriate. However, in this case, U.S. EPA has created general categories to group related comments. Persons wishing to see the full text of all comments should refer to the commenter's submittal to U.S. EPA which has been included in the Administrative Record.

Specific responses by U.S. EPA are indexed for convenient reference. These indices run consecutively throughout the entire Response Summary. Comments are shown in normal text and U.S. EPA's responses are shown in an italicized type style.

U.S. EPA's recommended alternative, monitored natural attenuation, is the best choice. Seven of twelve commenters expressed support for the remedy. Those who stated a reason noted the precautions the City had taken to hook up potentially vulnerable residential wells to city water and that the facts supported this choice.

Response: *U.S. EPA notes the support for the monitored natural attenuation option.*

Oxygen enhancement with biosparging is a better choice. Two of twelve commenters preferred this alternative over U.S. EPA's recommended option. One commenter who lives on Jefferson Street expressed concern that a spreading plume will reduce his property values and could cause health problems. He also thought it was important not to wait and do nothing to prevent contamination of the City's water supply. The other commenter noted that contrary to

U.S. EPA's evaluation of the alternatives against the nine criteria, all options are implementable because all materials can be purchased.

> ***Response:*** *The cleanup of contamination should raise property values in and around the cleanup area above what they would be if no such cleanup took place. People are not being exposed to contaminated groundwater because no one is drinking water in the impacted area: residents are on municipal water and are restricted from using the groundwater. The City of Tomah's wells are located in areas that are northwest, south, and southeast of the site. The contaminated groundwater will never move toward the City's wells because the direction of groundwater flow is toward the northeast.*
>
> *Natural attenuation is breaking down the contaminants in the groundwater, resulting in a reduction of toxicity and volume of contamination. Monitored natural attenuation will achieve the same beneficial results that an engineered treatment system, such as, biosparging would accomplish. The predicted cleanup time frame for both alternatives is 40 to 50 years.*
>
> *Implementability addresses the technical and administrative feasibility of implementing an alternative, the availability of the necessary services, and materials required during its implementation. We evaluated each alternative for the following: ability to construct the technology and reliability of its operation; ease of undertaking the operation; and availability of services and materials. The problem is not the availability of services and material but the ease of undertaking the operation. Monitored natural attenuation could be readily implemented even though some clearing may by necessary to install the 15 new wells. However, biosparging would be more difficult to implement because of the rough terrain and the significant clearing of properties that would be necessary to install approximately 40 injection points.*

Monitored natural attenuation is a bad choice; a more aggressive plan is needed as with Sparta landfill or other municipal landfills. One additional commenter is opposed to monitored natural attenuation and wants a more aggressive cleanup. He views monitored natural attenuation as favorable to the responsible parties as it is the least costly option with no environmental benefit. He is concerned that the fox is being able to guard the henhouse.

> ***Response:*** *Monitored natural attenuation is breaking down the contaminants in the groundwater resulting in a reduction of toxicity and volume of contamination. Monitored natural attenuation will achieve the same beneficial results that an engineered treatment system. Additionally, the predicted cleanup time frames for each of the alternatives are about the same, 40 to 50 years.*
>
> *Cost is one of the factors the National Contingency Plan (NCP) - the Superfund regulations governing remedy selection - requires the Agency to consider. Where, as here, we have several remedial alternatives which achieve the same cleanup results but*

that their personal objectives of stature [sic], associated risks, and maximizing closure to this environmental hazard is their only concern."

> ***Response:*** *U.S. EPA may indeed conclude there would be an imminent and substantial threat to human health and the environment if no action is taken, even though, at the moment, there is no immediate danger. Where, as at the TMSL, there is vinyl chloride in groundwater in excess of federal drinking water standard, that condition could pose an imminent and substantial threat to human health if people were to use that groundwater as a drinking water source. The fact that the area at risk is now connected to municipal water is one of the conditions that has enabled U.S. EPA to select a remedy that may require a substantial amount of time to clean up the groundwater to drinking water standards. Additionally, residents in the immediate area of the landfill were at risk from exposure to landfill gases, but the source control measures have been effective in eliminating landfill gas migration.*

Compensation for polluted/devalued property. One commenter asked questions related to the compensation of citizens for pollution on private property and their legal standing and rights against those responsible for the pollution.

> ***Response:*** *It would not be appropriate for U.S. EPA to offer advice regarding what are essentially private legal matters. U.S. EPA's role at the TMSL Superfund Site is to protect human health and the environment by selecting an appropriate remedy and making sure that the remedy is implemented. To that end, U.S. EPA tries to have those responsible for the contamination do the work necessary and reimburse U.S. EPA for its response costs. But compensating individuals who may have claims for damages or injuries due to contamination coming from the Site is not part of the Superfund law or Agency practice. Those sorts of claims must be worked out the same way as any other damage or injury claim - through private lawsuits or agreement on fair compensation between the parties.*

Monitored natural attenuation not appropriate because waste has not been removed from the landfill first. One commenter, referring to U.S. EPA's Citizen Guide to Monitored Natural Attenuation, questions the appropriateness of monitored natural attenuation when the landfill waste has not been removed first as suggested in the guide.

> ***Response:*** *The source control remedy which includes installation of a low permeability geo-membrane, a geo-synthetic clay liner, and an active gas extraction system has contained the contamination. For purposes of promoting natural attenuation, this serves essentially the same purpose as removing the contamination.*

Effect of contamination on Deer Creek, wild life, and fruit. Two commenters expressed concern that U.S. EPA does not know the effect of the landfill on Deer Creek or surrounding wetlands or the wildlife that depends on these systems. Another concern is about the safety of

wild fruits that people and animals are eating.

> ***Response:*** *The Ecological Risk Assessment assessed the risk posed to the aquatic organisms and terrestrial animals by contaminants. The assessment included evaluating site-related stressors and nonsite-related stressors. Animals consuming plants and predators consuming animals are evaluated as nonsite-related stressors. The groundwater pathway was not addressed in the risk assessment because there was no direct route for biological receptors to be exposed to contaminated groundwater. However, because the shallow groundwater discharges to Deer Creek and its associated wetlands, the effects of the contaminated groundwater on the environment was assessed through the surface water and sediment pathway. It was determined that the principal ecosystem components at risk were the organisms directly exposed to contaminated surface water and sediment in Deer Creek and adjacent wetlands. Terrestrial organisms associated with the site were not considered at risk, based on benchmark values taken from technical literature. Exposure and risk to aquatic organisms was evaluated by directly comparing surface water and sediment exposure dose to National Ambient Water Quality Criteria, state standards, and benchmark values taken from technical literature. Based on this analysis, cobalt and manganese in surface water were the only metals found that would potentially pose a risk to aquatic organisms. Actual damage to the aquatic and terrestrial ecosystem of Deer Creek and the adjacent wetlands were not observed. The Wisconsin Department of Natural Resources has recently re-classified Deer Creek from a Class II to a Class I trout habitat. However, there is a possibility that future impacts could occur from the discharges of contaminated groundwater into the surface water system. Therefore, Deer Creek will be monitored as part of the cleanup plan to determine if there is any impact from groundwater discharge.*
>
> *The human health risk assessment evaluated the risk due to exposure to surface water, sediment, and groundwater. The risk to people eating wild fruit was not considered a likely exposure pathway because the trees are not in contact with contaminated soil and the trees would probably have no contact with contaminated groundwater.*

What happens if the remedy doesn't work? One commenter asked what would happen if the cleanup remedy didn't work? He also posed several questions about what would happen if private wells became contaminated that aren't contaminated now such as who would cover the costs of putting in a new well and if private citizens could be required to hook up to the city water system and would they be able to return to private water once contamination was gone?

> ***Response:*** *Contingency actions will be implemented if the monitoring identifies the need for modification or changes in the remedy. Possible contingency actions could include: collecting groundwater samples more frequently; installing additional monitoring wells; and implementing additional response actions, such as, a groundwater containment or treatment system.*

Because the new landfill cap is effectively containing contamination with the TMSL, U.S. EPA thinks that the likelihood of additional drinking water wells becoming contaminated is low. However, if additional private wells do become contaminated in the future as a result of the movement of contamination from the landfill, U.S. EPA would expand the remedy to include provision of safe drinking water to the affected area. In all likelihood, this would be done by the same method and under the same terms as has been used to date - via the extension of Tomah's municipal water system. If at some point ground water returns to safe levels, the Superfund remedy would not require continued restrictions on well use. However, such restrictions might still be required under state or local ordinances.

Jurisdictional issues related to the use of groundwater by private parties. One commenter asked a number of questions related to the jurisdiction of various parties – particularly the City of Tomah – to regulate the use of private wells and associated equipment, to require connection to city water, to not allow disconnection when contamination is no longer an issue, to require payment for city water when the city is legally responsible for the contamination.

Response: *These questions should be addressed to the City of Tomah. In making its remedy decision, U.S. EPA was aware of the fact that the City had extended the municipal water system to a number of residents affected by the TMSL, and that the City planned additional extensions to residents living along Flatter Avenue. But extension of the municipal water supply is not currently a part of the remedy U.S. EPA selected. As noted in response to a previous comment, provision of municipal water might be something that is added to the remedy in the event that additional drinking water wells are contaminated by the migration of contaminants from the landfill. Extension of municipal water would most likely take place in the same manner and on the same terms as it has to date.*

Why were residents along Flatter Avenue required to sign-up for city water before the U.S. EPA public meeting where they would be informed about U.S. EPA's proposed cleanup option? Two commenters were concerned about the test results that justify the need for hook up? Another commenter expressed their concern about bottle water being too expensive to supply for drinking and bathing purposes.

Response: *These questions should be addressed to the City of Tomah since U.S. EPA was not involved in arranging for extension of municipal water to Flatter Avenue. As noted above, U.S. EPA was aware of the City's plans, but the provision of additional hook-ups to municipal water is not a requirement of the remedy U.S. EPA proposed.*

U.S. EPA's oversight role. One commenter posed questions regarding U.S. EPA's role in overseeing the City of Tomah as it carries out the water line extension project on Flatter Avenue and other projects related to the contaminated groundwater. The commenter is concerned that U.S. EPA ensures all the public's questions are answered. Related questions from this

commenter pertained to communication about the project to the public.

> ***Response:*** *As noted above, the extension of municipal water to Flatter Avenue is not part of the remedy U.S. EPA proposed. U.S. EPA has no oversight role with respect to that project. Questions about the project should be addressed to the City of Tomah.*
>
> *The U.S. EPA performs oversight of activities relating to investigations/cleanup and these questions should be directed to the U.S. EPA. In the past, U.S. EPA has held pubic meetings to inform local residents about the Superfund process and proposed cleanup plans for the TMSL. Additionally, fact sheets were distributed to inform residents about both proposed cleanup plans. U.S. EPA has responded to all telephone calls. U.S. EPA has answered questions during the question and answer period of the public meeting. The formal oral public comments given during the public meeting and written comments received during the public comment period are being addressed in this responsiveness summary.*

Monitoring plan. One resident asked whether wells at homes on Flatter Avenue not hooked to city water would be monitored or used as sentinel wells. In addition, he asked when additional monitoring wells would be added to the network and where they would be placed.

> ***Response:*** *Some of the residential wells along Flatter Avenue may remain in the monitoring program and new ones may be added. The details of the new groundwater monitoring plan will be worked out after the Record of Decision has been finalized.*

Request for independent testing by private parties. One commenter indicates that tests conducted of Deer Creek and adjacent property confirm "levels in excess of the limits." He requests that an independent consultant hired by private parties test and monitor properties to verify the levels against those taken by the responsible parties' consultant. The commenter also wants the U.S. EPA to have the responsible parties reimburse the private parties.

> ***Response:*** *Deer Creek will be monitored as part of the cleanup plan to determine if there is any impact from groundwater discharge. The groundwater monitoring program will evaluate the effectiveness and protectiveness of monitored natural attenuation. The monitoring data will tell us how monitored natural attenuation is working and whether the plume is shrinking or expanding. The locations where the independent test samples were collected will be useful for designing the sampling program for Deer Creek, but U.S. EPA needs more information about the other results to determine if there is a groundwater problem.*
>
> *U.S. EPA cannot pay for independent testing by private parties, nor can it force the responsible parties to pay. However, private parties can make a request to the responsible parties on their own behalf. U.S. EPA performs oversight of all activities related to the investigation and cleanup at this site, which can also include sampling*

verification. U.S. EPA may analyze the responsible parties' duplicate samples in the future if warranted.

Request for Environmental Impact Statement. One commenter requested an Environmental Impact Statement since he hadn't heard anything other than expense as to the reason for the recommendation of monitored natural attenuation.

Response: *Environmental impact statements under the National Environmental Policy Act (NEPA) are not required for Superfund cleanup projects. The objectives served by environmental impact statements are met under Superfund via completion of a RI/FS, and the selection of a remedy using the criteria and the procedures provided in the National Contingency Plan, 40 C.F.R. 300 et seq. The RI/FS and remedy decision documents for the TMSL Site are available for public inspection at Tomah Public Library.*

U.S. EPA ADMINISTRATIVE RECORD
REMEDIAL ACTION
TOMAH SANITARY LANDFILL
TOMAH, WISCONSIN
ORIGINAL
08/30/95

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DOC#	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	12/16/83	Eigenbrodt, V., WDNR	U.S. EPA	Preliminary Assessment	5
2	06/27/84	Nolan, C., Ecology and Environment, Inc.	U.S. EPA	Site Inspection Report	14
3	12/05/84	Nolan, C., Ecology and Environment, Inc.	File	Memorandum re: June 19, 1984 Site Inspection	3
4	03/26/92	Ecology and Environment, Inc.	U.S. EPA	Letter Report	113
5	09/00/93	U.S. EPA/OSWER	U.S. EPA	Quick Reference Fact Sheet: "Presumptive Remedies: Policy and Procedures" (OSWER Directive 9355.0-47FS; EPA 540-F-93 047; PB 93-963345)	8
6	09/00/93	U.S. EPA/OSWER	U.S. EPA	Quick Reference Fact Sheet: "Presumptive Remedy for CERCLA Municipal Landfill Sites" (OSWER Directive 9355.0-49FS; EPA 540-F-93-035; PB 93-963339)	14
7	03/10/94	Dames & Moore	U.S. EPA	Work Plan (DRAFT): Volume 1 of 2 (Text and Attachments A-B)	265
8	03/10/94	Dames & Moore	U.S. EPA	Work Plan (DRAFT): Volume 2 of 2 (Attachments C-E)	342
9	06/18/94	Dames & Moore	U.S. EPA	Work Plan: Addendum I	154
10	07/13/94	Trainor, D. and Steiner, J., Dames & Moore	Mankowski, M., U.S. EPA	Letter re: D&M's Responses to U.S. EPA's Quality Assurance Section Comments to Addendum I of the Work Plan	9
11	02/21/95	Dames & Moore	U.S. EPA	Remedial Investigation Report (DRAFT): Volume 1 of 2 (Text)	146
12	02/21/95	Dames & Moore	U.S. EPA	Remedial Investigation Report (DRAFT): Volume 2 of 2 (Appendices A-F)	770

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U.S. ENVIRONMENTAL PROTECTION AGENCY
REMEDIAL ACTION

ADMINISTRATIVE RECORD
FOR
TOMAH SANITARY LANDFILL SITE
TOMAH, MONROE COUNTY, WISCONSIN

UPDATE #1
JULY 25, 1997

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	06/13/95	Dames & Moore	U.S. EPA	Work Plan for Phase II of the Remedial Investigation/Feasibility Study (RI/FS) at the Tomah Municipal Sanitary Landfill Site	242
2	06/14/95	Trainor, D., Dames & Moore	Mankowski, M., U.S. EPA	Letter: D&M's Responses to U.S. EPA Comments on Phase I Draft RI Report and the Phase II Work Plan	79
3	07/13/95	Mankowski, M., U.S. EPA	Patterson, K., City of Tomah	Letter re: U.S. EPA/WDNR Conditional Approval of the Phase II RI Work Plan for the Tomah Municipal Landfill Site w/Comments	9
4	12/20/95	Trainor, D., Dames & Moore	Mankowski, M., U.S. EPA	Letter: D&M's Responses to Conditional Approval of the RI Phase II Work Plan	24
5	04/00/96	Dames & Moore	U.S. EPA	LFG Migration Control Project Report for the Tomah Landfill Site	110
6	04/03/96	Kuhlman, W.; Boardman, Suhr, Curry & Field	Mankowski, M. and N. Zippay, U.S. EPA	Letter re: Outline of Measures Concerning the Methane Issue	5
7	04/24/96	Zippay, N. and M. Mankowski, U.S. EPA	Kuhlman, W.; Boardman, Suhr, Curry & Field	Letter re: U.S. EPA Approval of Proposed Short Term Measures as Outlined in the Design Specifications	2
8	06/12/96	Ch2M Hill	U.S. EPA	Final Risk Assessment for the Tomah Municipal Sanitary Landfill Site	177
9	06/13/96	Mankowski, M., U.S. EPA	Patterson, K., City of Tomah	Letter re: U.S. EPA/WDNR Conditional Approval of the Draft Final RI Report and the Responses to U.S. EPA Comments on the Draft Final RI Report	10

U.S. ENVIRONMENTAL PROTECTION AGENCY
REMEDIAL ACTION

ADMINISTRATIVE RECORD
FOR
TOMAH MUNICIPAL SANITARY LANDFILL SITE
TOMAH, WISCONSIN

UPDATE #2
SEPTEMBER 12, 1997

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	08/18/97	Southwest Reporters, Inc.	U.S. EPA	Transcript of Proceedings: August 18, 1997 U.S. EPA Public Meeting re: the Tomah Armory Landfill and Tomah Municipal Sanitary Landfill Sites	102
2	09/04/97	Johnson, W., City of Tomah	Bill, B., U.S. EPA	Letter re: City of Tomah's Comments on the Proposed Plan for the Tomah Municipal Sanitary Landfill Site	2
3	09/04/97	Marshall, D., Union Camp Corporation	Bill, B., U.S. EPA	Letter re: Union Camp's Comments on the Proposed Plan for the Tomah Municipal Sanitary Landfill Site	31
4	09/05/97	Tomah Residents	U.S. EPA	Three Public Comment Sheets re: Citizens' Comments on the Proposed Plan for the Tomah Municipal Sanitary Landfill Site (PORTIONS OF THIS DOCUMENT HAVE BEEN REDACTED)	3

U.S. ENVIRONMENTAL PROTECTION AGENCY
REMEDIAL ACTION

ADMINISTRATIVE RECORD
FOR
TOMAH MUNICIPAL SANITARY LANDFILL SITE
TOMAH, WISCONSIN

UPDATE #3
OCTOBER 8, 1997

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	09/30/96	Mankowski, M., U.S. EPA	Patterson, K., City of Tomah	Letter re: Potential Federal and State ARARs for the Tomah Municipal Sanitary Landfill Site	19
2	09/25/97	U.S. EPA	Public	Record of Decision for the Tomah Municipal Sanitary Landfill Site	44
3	09/26/97	Meyer, G., WDNR	Muno, W., U.S. EPA	Letter re: WDNR's Concurrence on the Selected Interim Source Control Remedy for the Tomah Municipal Sanitary Landfill Site	2

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
8	08/00/01	Conestoga-Rovers & Associates	U.S. EPA	Quarterly Monitoring Report May-July 2001 for the Tomah Municipal Sanitary Landfill Superfund Site	372
9	08/29/01	Mankowski, M., U.S. EPA	Schumer, S., International Paper	Letter re: Approval of the O&M Plan and Completion of the Construction Report for the Tomah Municipal Sanitary Landfill Site	1
10	09/24/01	Kamm, K., Conestoga-Rovers & Associates	Residents, Tomah, WI	Letters re: Groundwater Sampling Results of Residential Properties	11
11	11/00/01	Conestoga-Rovers & Associates	U.S. EPA	Quarterly Monitoring Report August-October 2001 for the Tomah Municipal Sanitary Landfill Site	219
12	02/00/20	Conestoga-Rovers & Associates	U.S. EPA	Quarterly Monitoring Report November 2001-January 2002 for the Tomah Municipal Sanitary Landfill Site	277
13	02/20/02	Sandburg, B., Conestoga-Rovers & Associates	Mankowski, M., U.S. EPA	Letter re: Modifications to the Groundwater Sampling Program at the Tomah Municipal Sanitary Landfill Site	2
14	05/00/02	Conestoga-Rovers & Associates	U.S. EPA	Quarterly Monitoring Report February-April 2002 for the Tomah Municipal Sanitary Landfill Site	436
15	05/00/02	Conestoga-Rovers & Associates	U.S. EPA	Natural Attenuation Sampling Plan for the Tomah Municipal Sanitary Landfill Site	36
16	07/11/02	Kamm, K., Conestoga-Rovers & Associates	Boone, D., U.S. EPA	Letter re: Response to U.S. EPA's Comments on the Natural Attenuation Sampling Plan for the Tomah Municipal Sanitary Landfill Site	4
17	07/11/02	Kamm, K., Conestoga-Rovers & Associates	Boone, D., U.S. EPA	Letter re: Response to U.S. EPA's Comments on the Groundwater QAPP Addendum for the Tomah Municipal Sanitary Landfill Site w/Attachment	77

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18	08/00/02	Conestoga-Rovers & Associates	U.S. EPA	Quarterly Monitoring Report May-July 2002 for the Tomah Municipal Sanitary Landfill Site	69
19	08/05/02	Boone, D., U.S. EPA	Schumer, R., International Paper	Letter re: Conditional Approval for the Revised Groundwater QAPP Addendum and Natural Attenuation Sampling Plan for the Tomah Municipal Sanitary Landfill Site	2
20	11/00/02	Conestoga-Rovers & Associates	U.S. EPA	Quarterly Monitoring Report August-October 2002 for the Tomah Municipal Sanitary Landfill Site w/Transmittal Letter	66
21	04/00/03	Conestoga-Rovers & Associates	U.S. EPA	Operable Unit 2 Feasibility Study for the Tomah Municipal Sanitary Landfill Site	308
22	05/19/03	Boone, D., U.S. EPA	Schumer, R., International Paper	Letter re: Approval with Modifications of the Feasibility Study for Operable Unit 2 for the Tomah Municipal Sanitary Landfill Site	3

U.S. ENVIRONMENTAL PROTECTION AGENCY
REMEDIAL ACTION

ADMINISTRATIVE RECORD
FOR
TOMAH MUNICIPAL SANITARY LANDFILL (OU2) SITE
TOMAH, WISCONSIN

UPDATE #5
SEPTEMBER 23, 2003

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	00/00/00	Friske, L., Tomah Resident	U.S. EPA	Letter re: Response to the June 24, 2003 Public Meeting on the Proposed Plan for the Tomah Municipal Sanitary Landfill Site	15
2	06/00/03	U.S. EPA	Public	Fact Sheet: EPA Proposes Plan for Contaminated Ground Water at the Tomah Municipal Sanitary Landfill	8
3	06/10/03	Rusch, J., City Administrator, City of Tomah	Bill, B., U.S. EPA	Letter re: Proposed Plan for the Tomah Municipal Sanitary Landfill Site	1
4	06/11/03	Ludiking, C., Mayor, City of Tomah	Bill, B., U.S. EPA	Letter re: Proposed Plan for the Tomah Municipal Sanitary Landfill Site	1
5	06/11/03	Schliecher, T., Alderman, City of Tomah	Bill, B., U.S. EPA	Letter re: Proposed Plan for the Tomah Municipal Sanitary Landfill Site	1
6	06/24/03	U.S. EPA	Public	News Release: Public Meeting to Discuss Proposed Plan for Contaminated Ground Water at the Tomah Municipal Sanitary Landfill Site	1
7	06/24/03	Benchmark Reporting Agency	U.S. EPA	Transcript of June 24, 2003 Pubic Meeting on the Proposed Plan for Contaminated Ground Water at the Tomah Municipal Sanitary Landfill Site	77
8	07/10/03	Tomah Residents	U.S. EPA	Public Comment Sheets: Comments on U.S. EPA's Proposed Plan for the Tomah Municipal Sanitary Landfill Site	6
9	07/23/03	Thorson, P., Managed Investments, Inc.	Bill, B., U.S. EPA	Letter re: Public Comment on the Tomah Municipal Sanitary Landfill Site w/Attachments	8

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
10	07/24/03	U.S. EPA	Public	News Release: U.S. EPA is Extending the Public Comment Period for the Tomah Municipal Sanitary Landfill Site for Contaminated Ground Water	1
11	09/08/03	Sandberg, B., Conestoga-Rovers & Associates	Boone, D., U.S. EPA	Letter re: Institutional Controls Associated with the Groundwater Operable Unit of the Tomah Municipal Sanitary Landfill Site w/Attached Map	4